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International Journal of Progressive Education, Volume 11 Number 3, 2015  $\ensuremath{\mathbb{C}}$  2015 INASED

### TABLE OF CONTENTS

Volume 11, Number 3 October 2015

#### Articles

## 7 Predictive Power of Prospective Physical Education Teachers' Attitudes towards Educational Technologies for Their Technological Pedagogical Content Knowledge

Author: Yaprak Kalemoğlu Varol

20 Natural Sciences Teachers' Skills of Managing the Constructivist Learning Environment

Author: Şendil Can & Güliz Kaymakcı

32 Effects of an SWH Approach and Self-Evaluation on Sixth Grade Students' Learning and Retention of an Electricity Unit

Authors: Esra Kabataş Memiş & Sabriye Seven

50 An Action Research on Employing Constructivist Multi-Assessment Strategy in Teacher Education

Author: Kerim Gündoğlu

64 Women Educational Leaders' Narratives: The Dynamics of Service Learning on Training and Transformation

Authors: Dannielle Joy Davis & Amanda Major & Debra Cook & Janel Bell

77 Effects of the Physical Laboratory versus the Virtual Laboratory in Teaching Simple Electric Circuits on Conceptual Achievement and Attitudes towards the Subject

Authors: Ahmet Tekbiyik & Orhan Ercan

90 Analysis of the Relationship between Estimation Skills Based on Calculation and Number Sense of Prospective Classroom Teachers

Authors: Ali Şenol & Sefa Dündar & Nazan Gündüz

## 106 Science and Technology Teachers' Views about the Causes of Laboratory Accidents

Author: Cemil Aydoğdu

119 The Correlation between Organizational Commitment and Occupational Burnout among the Physical Education Teachers: The Mediating Role Of Self-Efficacy

Author: İrfan Yıldırım

#### 131 Comprehending Elementary School Teachers' Classroom Management Approaches

Author: *Ali Ekber Şahin* 

## 140 Investigation of Preservice Teachers' Speech Anxiety with Different Points of View

Author: Fatih Kana

# 153 Investigation of the Motivation Level of Teachers Working at State Schools in Relation to Some Variables

Author: Süleyman Can

## 162 Hierarchical Classification of Values

Author: Gürkan Ergen

Predictive Power of Prospective Physical Education Teachers' Attitudes towards Educational Technologies for Their Technological Pedagogical Content Knowledge

Yaprak Kalemoğlu Varol\* Aksaray University

### Abstract

The aim of the research is to determine the predictive power of prospective physical education teachers' attitudes towards educational technologies for their technological pedagogical content knowledge. In this study, a relational research model was used on a study group that consisted of 529 ( $M_{age}$ =21.49, SD=1.44) prospective physical education teachers. As a data collection tool, a "technology attitude scale" and a "technological pedagogical content knowledge scale" were used. Regarding analyses, inferential statistics as correlation and regression analyses were used, in addition to descriptive analyses. At the end of the research period, it was observed that attitudes towards educational technologies had a high-level effect on technological pedagogical content knowledge, and the variables that constituted a sub-dimension of the attitude scale for educational technologies explained 31% of the total variance in technological pedagogical content knowledge. In addition, it was established that attitudes towards educational technological educational technological pedagogical content knowledge. In addition, it was established that attitudes towards educational technological educational technological pedagogical content knowledge.

**Keywords:** technological pedagogical content knowledge; attitude toward educational technology; prospective physical education teacher

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## Introduction

Education is a subject that is highly emphasised in the progress of societies and powerful in the formation of countries' futures. At this point, the education field is one of the most important fields where technologies are used in the development of societies' futures. In developed countries, most notably, societies make an effort to educate their citizens using technology. According to Erdemir, Bakırcı and Eyduran (2009), many educators, teachers and researchers see technology as part of a high-quality education; therefore, the importance of technology integration in schools has increased. In this respect, technology integration has become a necessity in education (Liao, 2007).

Technology integration in education is a complicated process that involves many elements (Britten & Cassady, 2005; Eryaman, 2006; 2007). Pedagogical knowledge (PK), field information and technological information are inseparable parts of this process. PK is the knowledge of teachers regarding processes, applications, teaching methods and learning (e.g. knowledge about how to use different teaching styles). Content knowledge (CK) is knowledge about subject areas that teachers must learn (e.g. knowledge about anatomy, biomechanics and gymnastics). Technological knowledge (TK) is knowledge about standard technologies, including books, chalk and blackboards, and developed technologies, including the Internet and digital video (e.g. knowing how to use digital tools). These three knowledge bases (PK, CK and TK) form the core of the Technological Pedagogical Content Knowledge (TPACK) framework (Baert & Stewart, 2014; Koehler & Mishra, 2008; Mishra & Koehler, 2006).

TPACK is identified as a knowledge type that exists when technological knowledge is incorporated into pedagogical content knowledge (PCK), a notion developed by Shulman (1986), in the region where TK, PK and subject area knowledge coincide and interact with these three knowledge types (Mishra & Koehler, 2006; Koehler, Mishra & Yahya, 2007; Niess, 2005). According to Mishra and Koehler (2006), TPACK is an important knowledge type that is different from subject area knowledge, which belongs to the discipline of a field expert, TK, belonging to technology experts, and PK, belonging to a teacher. This analysis goes beyond the three components of content, pedagogy and technology (Fig. 1) (e.g. knowledge about how to use video analysis apps to assess students' movements in physical education). Technological content knowledge, identified in Fig. 1, is the use of suitable technologies for a field that will be taught (e.g. knowledge about using fitness apps to track progress). Technological pedagogical knowledge (TPK) knows how to achieve better results using different technologies in education (e.g. the notion of using Excel to manage attendance). Pedagogical content knowledge (PCK), proposed by Shulman (1987), involves content knowledge that deals with the teaching process (e.g. knowledge of using command styles when teaching dance).



Figure 1. The TPACK Framework (Image from http://tpack.org).

In a period known for knowledge and communication technologies, teachers should be technologically literate and they should use the technological knowledge they have in class applications both meaningfully and responsively (Mishra & Koehler, 2006; Schmidt & Diğerleri, 2009; Valanides & Angeli, 2008). The International Society for Technology in Education (ISTE), an institution in the educational technology field, has identified technology literacy standards and performance indicators for teachers, and it has determined that prospective teachers should use technological tools effectively and employ technological skills. From this perspective, it is thought that the TPACK model can present teachers and prospective teachers with a deeper perspective about the integration of technology into the teaching process.

In the researches conducted about TPACK, the profiles of teachers and prospective teachers were analysed (Koh, Chai & Tsai, 2010) for their levels of competences regarding TPK (Archambault & Crippen, 2009; Baert & Stewart, 2014; Kwon, 2013; Semiz & Ince, 2012), and their applications of TPACK competences were established (Harris & Hofer, 2011). In addition, it was determined that offering pre-service and in-service career development activities to teachers and prospective teachers had an important effect, generally, on the development of their TPK (Cengiz, 2014; Guzey & Roehrig, 2009; Jang, 2010; Richardson, 2009). When studies conducted on TPACK are analysed, it is observed that research groups are great in number when it comes to mathematics and sciences, generally. Studies about physical education, however, are limited (Baert & Stewart, 2014; Cengiz, 2014; Semiz & Ince, 2012), and they have been performed only over the last two years. However, as with all other education fields, using technology is very important in teaching physical education to provide total support for the lessons. It is thought that the use of technology by teachers in learning environments will increase the success of students. Thus, the National Association for Sport and Physical Education (NASPE) has maintained that technology, when used correctly, is a useful tool that completes the education experience (2004). In addition, researchers have identified different instructional-, sport- and physical education-related technologies that can enhance the benefits of teaching physical education (Roblyer & Doering, 2005). However, wireless technology, computer projection systems and physical activity observation instruments have allowed technology to move into the sports arenas of schools. Technology has gained a new dimension for physical education with the latest developments in games, such as 'exergaming', video

games that incorporate the use of physical activities (Thompson, 2008). Nowadays, with a simple tablet PC and projector, numerous advantages can be realised in a physical education lesson. For example, teachers can use video analysis programs, they can provide feedback to students with videos and photos or they can take notes regarding the performances of students. Therefore, TPACK has become more important to physical education teachers in recent years.

However, as well as having competences regarding TPACK and providing opportunities to use technology more efficiently and actively, the perspectives and attitudes of prospective teachers and teachers regarding technology are very important. In this case, the necessity for knowing the attitudes and ideas regarding the technological instruments that teachers will use in the teaching-learning process grows. Thus, as Christanse (2002) and McGrail (2005) have stated, the attitudes and self-confidences of newly working teachers regarding technology use play important roles in whether they use technology in the learning environment as well as, in effect, the successes of students. At the same time, recent studies have shown that the effective use of educational technologies depends largely on the attitudes of the teachers. A study conducted by Bullock (2004) demonstrated that teachers' attitudes are key enabling or disabling factors in the adoption of technology. In the same way, Kersaint, Horton, Stohl and Garofalo (2003) found that teachers who have positive attitudes towards technology feel more comfortable with using it and usually incorporate it into their teaching. From these results, when it is considered that the years between the ages of 12 and 30 are important in the formation and development of attitudes (Morgan, 2000), it can be said that the years that include the university education of prospective teachers have great importance in almost all countries. It is thought that the positive attitudes of prospective teachers towards using technology developed during these years will lead to more willingness to use technology in education and in further professional life. When this information is considered, it is thought that attitudes towards technology in education may have an important effect on TPACK. When there is such an effect, it is important to demonstrate the benefits of using technology in education to prospective teachers and to resolve to use these technological tools instead of only focusing on gaining TPACK at universities.

When studies conducted about attitudes towards technology in education were analysed, it was observed that using technological instruments in education affected the attitudes of students positively (Yavuz & Çoskun, 2008). In another study, it was established that there was a positive relationship between attitudes towards computers and attitudes towards the educational technologies of prospective teachers (Teo, 2008). In a study conducted by Kalemoğlu-Varol (2014), a positive relationship between attitudes towards educational technologies and computer self-competence beliefs was observed. In addition, it was observed that attitudes towards educational technologies had a medium-level effect on computer self-competence beliefs, and attitudes towards technology explained 11% of the total variance in computer self-competence beliefs. The studies conducted by Y1lmaz et al (2010) identified the attitudes towards technological instrument usage in the educational activities of students increased as a result of project studies supported by technology. In other words, it was understood that project studies supported by technology. In other words, it was understood that project studies, it was observed that teachers had positive attitudes towards using technology in education (Albirini, 2006; Enayati, Modanloo & Kazemi, 2012).

When studies conducted on the use of technology in education were analysed, none supported any analyses of the effects of attitudes towards using technology in education on TPACK. In fact, as Rikard and Banville (2006) have stated, attitudes form the behaviours of humans, determine their participation in activities and operationalise individuals. If a physical education teacher that has TPACK does not have a positive attitude towards using technology in education, he or she may not to want to, or cannot, realise this competence. For this reason, it is observed that knowing the effects on existing hardware as well as

the studies about teachers' technological pedagogical hardware may provide benefits. In this respect, this study aimed to analyse the effects of the attitudes of prospective physical education teachers towards using technology in education on TPACK.

## Methods

#### **Study Model**

A relational research model was used in this study to identify the relationship between two or more variables and to gain insight into cause–effect relationships (Karasar, 2014). The research aimed to establish a regression level of the technological pedagogical education knowledge of physical education teachers and their attitudes towards using technology in education; therefore, the attitudes of prospective physical education teachers towards using technology and their technological pedagogical education knowledge levels were established.

#### **Participants and Procedure**

Teacher candidates at four different universities (Aksaray University, Niğde University, Karamanoğlu Mehmet Bey University and Erciyes University) during the 2013-2014 academic year, as selected using a random sampling method, constituted the study group. The author implemented both scales, and information was given to the students regarding the purposes of the items and the instructions for how to use them. It took approximately 20 minutes for the students to complete the items, including instruction and collection. Out of the 542 completed items, 529 were viable, but the other 13 were missing responses. Furthermore, 222 (42%) of 529 teacher candidates ( $M_{age}$ =21.49, SD=1.44) were female and 307 (58%) were male ( $N_{year-3}$ =311;  $N_{year-4}$ =218).

#### The Physical Education Teacher Education Program in Turkey

A common program prepared by higher education institutions and that is compulsory in all universities is used in the institutions that educate physical education teachers in Turkey. According to this program, a period of study consists of 8 terms (4 academic years). In this program, the lessons about educational technologies include the "Computer I" and "Computer II" class taken in the year 2 and the "Instructional Technology and Material Design" class taken in the year 3. For this reason, the study group is chosen from prospective teachers in years 3 and 4 for the study to achieve the most effective results and to realise the aim fully.

#### **Data-collection Tools**

Data was collected from our participants through a 'technology attitude scale' and a 'technological pedagogical content knowledge scale'.

## **Technology Attitude Scale**

The scale, which was developed by Yavuz (2005), constitutes five factors, including 'not using technological tools in education'; 'using technological tools in education'; 'the effects of technology on educational life'; 'teaching how to use technological tools' and 'evaluating technological tools'. The scale consisted of 19 items, 6 of which were negative and 13 of which were positive. The Cronbach's alpha value was calculated as .87 for the whole scale, and items estimated in the scale's total correlations for item discrimination and item difficulty changed between .24–.68. The scale is a 5-point Likert-type scale that uses the following measurements: (1) I definitely disagree; (2) I disagree; (3) I am neutral; (4) I agree

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and (5) I definitely agree. The positive items of the scale started with "I definitely agree" and continued with 5, 4, 3, 2, and 1; the negative expressions started with "I definitely disagree" and continued with 5, 4, 3, 2, and 1. At the end of the internal-consistency analysis performed in this study, the Cronbach's alpha value was calculated as .88 for the whole scale.

## Technological Pedagogical Content Knowledge (TPACK) Scale

This scale, developed by Kabakci-Yurdakul, Odabasi, Kilicer, Coklar, Birinci and Kurt (2012), consists of 33 items and 4 factors, including design, exertion, ethics and proficiency. All items that exist on the scale consist of positive statements. Items on the scale are set up using a 5-point Likert-type scale, including (5) I can do easily; (4) I can do; (3) I can do partly; (2) I cannot do and (1) I certainly cannot do. The Cronbach's alpha coefficient for the whole scale was found to be .95, whereas the values of the Cronbach's alpha coefficients for the individual factors of the scale ranged between .85 and .92. A confirmatory factor analysis was conducted within the scope of a valid study of the scale. In this way, the structure of the 4-factor scale was confirmed. In addition, the test–retest reliability coefficient of the scale was calculated as .80. The lowest score that will be taken from the scale is 33, and the highest score is 165. When scores calculated from the scale approach 165, the technological pedagogical competence increases, and when it approaches 33, the technological pedagogical competence decreases. After the internal-consistency analysis was performed in this study, the Cronbach's alpha values were calculated as .97 for the whole scale, .93 for the design scale, .92 for the exertion scale, .93 for the ethics scale and .89 for the proficiency scale.

## **Data Analysis**

Before the analysis of the study data, the distribution was examined. The Lilliefors Kolmogorov– Smirnov test indicated that the study data were in conformity with a normal distribution (p>.05). The histogram graphics and normal distribution curve were determined by Skewness (between +1 and -1) and Kurtosis (between +2 and -2), and further analyses were performed accordingly. In the study, the arithmetic means of the items that were included in each sub-scale were calculated and after this calculation, the score was determined for each relevant factor. The analysis was performed via these factor scores. In the analysis of the data, a descriptive analysis (number, per cent, arithmetic mean and standard deviation) was used. The Pearson Moments Multiplication Correlation Coefficient technique was used in order to identify a relationship. Furthermore, a multiple regression analysis was employed with the purpose of determining the predictive power of the independent variables over the dependent variables. In these analyses, each of the attitudes towards technology sub-scale scores was considered as an independent variable and technopedagogical education competency was considered a dependent variable. In the data analysis, the SPSS 18.00 package program was used.

## Findings

The arithmetic means and standard deviation values about the attitudes of prospective physical education teachers towards technological pedagogical education knowledge are shown in Table 1.

Table 1.

Scores of the attitudes towards educational technologies and technological pedagogical education knowledge

Dimension	n	M	SD
Technology attitude	520	71.02	11,37
Technopedagogical Education Competency		131,53	23,45

When Table 1 was analysed, it was established that the attitudes of prospective physical education teachers towards educational technologies (M=71.02, SD=11.37) and their technological education knowledge (M=131.53, SD=23.45) were at high levels.

## The Relationship between Attitudes towards Educational Technologies and Technological Pedagogical Education Knowledge

The analysis results identifying the relationship between attitudes towards educational technologies and technological pedagogical education knowledge are shown in Table 2.

Table 2.

The relationship between attitudes towards educational technologies and technological pedagogical education knowledge

Variables	1	2	3	4	5	6	7	8	9
1. Not using									
technological tools in	-								
education									
2. Using technological	507**								
tools in education	.307	-							
3. Effects of technology	617**	525**							
on educational life	.047	.555	-						
4. Teaching how to use	385**	558**	307**						
technological tools	.385	.558	.391	-					
5. Evaluating	275**	502**	221**	562**					
technological tools	.323	.392	.554	.302	-				
6. Design	.421**	.490**	$.448^{**}$	.173**	.116**	-			
7. Exertion	.400**	.433**	.465**	.165**	.246**	$.870^{**}$	-		
8. Ethics	.187**	.358**	.228**	.002	.037	.879**	.830**	-	
9. Proficiency	.327**	.491**	.252**	.001	.137**	.836**	$.788^{**}$	.894**	-
Mean	19.58	15.20	14.55	14.60	7.07	39.58	49.04	23.92	19.97
Standard Deviations	3.798	3.191	2.704	3.068	1.851	7.657	7.743	5.308	4.150
**p<0.01									

When Table 2 was analysed, it was observed that all of the sub-dimensions of the attitude scales regarding educational technologies correlated positively with all the variables that exist on the TPACK scale.

However, it was observed that the 'not using technological tools in education' sub-dimension of the attitude scale regarding educational technologies correlated with design (r=.421, p<.01), exertion (r=.400, p<.01) and proficiency (r=.327; p<.01) at a medium positive level. As well, the 'effects of technology on educational life' sub-dimension correlated with design (r=.448, p<.01) and exertion

(r=.465, p<.01) at a medium positive level. The 'using technological tools in education' sub-dimension correlated with all the variables that exist on the TPACK scale at a medium positive level.

The aim to determine the attitudes of prospective physical education teachers towards educational technologies, the regression levels of their technological educational competences and the results of the analyses are shown in Table 3. In the analyses, each of the sub-factor scores of the attitude scale regarding educational technology was considered an independent variable, and the TPACK scale was considered a dependent variable.

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The results of the analysis regarding regression of technological educational competences							
Variables	В	Standar d Error	ß	t	р	Dual r	Partial r
Constant	76.563	5.515		13.882	.000		
Not using technological tools in education	0.304	0.319	0.049	0.951	.342	.370	.042
Using technological tools in education	3.825	0.406	0.521	9.412	$.000^{**}$	.471	.381
Effects of technology on educational life	1.837	0.431	0.212	4.260	$.000^{**}$	.396	.183
Teaching how to use technological tools	1.634	0.362	- 0.214	-4.516	.000**	.111	194
Evaluating technological tools	-1.553	0.612	- 0.123	-2.535	.012	.152	110
<b>R</b> = 0.552	$R^2 = 0.30$	)5					
$\mathbf{F} = 45.871$	<b>p</b> = .000						

The results of the analysis recording regression of technological advectional competences

\*\*p<0.01

When the results in Table 3 were analysed, a regression equation ( $R^2$ =.31, F=45.87, p<.01) of the technological pedagogical education competences of the attitude scale regarding the educational technologies' sub-dimensions was important. The variables that constitute the sub-dimensions of the attitude scale regarding educational technologies explain 31% of the total variance in technological pedagogical education competences. According to the standardised regression coefficient (**B**), the relative order of importance of the predictor variables of technological pedagogical education competence is: 'using technological tools in education'; 'teaching how to use technological tools'; 'effects of technology on educational life'; 'evaluating technological tools' and 'not using technological tools in education'.

When the results of a t-test on the meaningfulness of the regression coefficients were analysed, it was observed that the 'using technological tools in education'; 'effects of technology on educational life' and 'teaching how to use technological tools' sub-dimensions were meaningful predictors of technological pedagogical education competence.

## **Discussion and Conclusion**

According to the findings obtained through the research, the attitudes of prospective physical education teachers towards education technology were at a good level (Table 1). This finding demonstrates a parallelism with some studies in which the attitudes towards education technology were determined (Albirini, 2006; Arslan, 2008; Basarici & Ural, 2009; Enayati et al, 2012; Yavuz & Coskun, 2008; Yılmaz et al, 2010). According to the other findings obtained from the research, prospective physical education teachers use technological pedagogical education knowledge at a good level (Table 1). These findings demonstrate parallelisms with the findings of studies performed on prospective physical education teachers by Semiz and Ince (2012) and Baert and Stewart (2014). In a study conducted by Koh, Chai and Tsai (2010), the TPACK levels of prospective teachers were found to be better than average.

When the relationship between the attitudes towards educational technologies and technological pedagogical education knowledge was analysed in the research (Table 2), it was established that all the sub-dimensions of the attitude scale regarding educational technologies correlated positively with all the variables that exist on the technological pedagogical education knowledge scale. Therefore, it can be argued that a positive increase in the attitudes towards technology may affect technological pedagogical education knowledge positively. No studies support this finding, so the results cannot be interpreted through comparisons with other research findings. However, when the attitudes that form human behaviour, determine their participation in activities and operationalise individuals are considered (Rikard & Banville, 2006), the findings obtained may be as expected. Thus, as Christanse (2002) and McGrail (2005) have stated, when prospective teachers start to work, their attitudes towards using technology play an important role in whether they use technology in the education environment. Recent studies have shown that the successful use of educational technologies depends largely on the attitudes of teachers. Bullock (2004) revealed that teachers' attitudes are significant enabling or disabling factors in the adoption of technology. In another study, Kersaint, Horton, Stohl and Garofalo (2003) found that teachers who have positive attitudes towards technology feel more comfortable with using it and usually incorporate it into their teaching.

In the research, it was determined that the sub-dimensions of the attitude scale regarding educational technologies had a high-level effect on technological pedagogical education knowledge (Table 3). In addition, the effects of attitudes towards educational technologies on technological pedagogical education knowledge were explained at a rate of 31%. In the research, it was observed that a positive increase in attitudes towards educational technologies had an important effect on increases in technological pedagogical education knowledge. In researching factors that affect attitudes towards educational technologies, concrete suggestions can be made to improve technological pedagogical education knowledge. However, it was observed that using technological tools in educational environments affected students' attitudes positively and students had positive interpretations of the use of technology (Yavuz & Coskun, 2008). In a study conducted on prospective physical education teachers, as a result of the project studies supported by technology, it was determined that the positive attitudes of students regarding the use of technological tools in their educational activities increased. In other words, it was observed that project studies supported by technology developed positive student attitudes towards technology (Yılmaz, Ulucan & Pehlivan, 2010). In another study, a relationship between prospective teachers' attitudes towards computers and their attitudes towards educational technologies was established (Teo, 2008). In a study conducted by Kalemoğlu-Varol (2014), a positive relationship was established between attitudes towards educational technologies and computer self-competence beliefs. It was established that attitudes towards educational technologies had a medium-level effect on computer self-competence beliefs, and attitudes towards technology explained 11% of the total variance in computer self-competence beliefs.

It is thought that the attitudes of individuals may reflect behaviours over time; therefore, it is thought that prospective teachers will develop positive attitudes towards using technology during their university years, encouraging them to use these technologies in their future professional life more actively and more efficiently. For this reason, the benefits of using technological tools in education during these years and encouraging the use of these technological tools will be expressed. In addition, when instructors realise the benefits of technological tools in the education process in universities, prospective teachers may experience positive effects.

There are some limitations in this study. It makes it harder to generalize the results of this study, because it has been conducted in only four universities, and the study group has been relatively small. This is the first study conducted to determine the predictive powers of prospective teachers' attitudes towards educational technologies for their technological pedagogical knowledge. Therefore, it is thought

that it will lead further studies to be conducted in the future in this field. For this reason, there is a need for similar field studies that can be conducted using different samples. In addition, it is thought that this type of study will be useful in explaining better the attitudes of prospective physical education teachers towards educational technologies and their technological pedagogical education knowledge.

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## Natural Sciences Teachers' Skills of Managing the Constructivist Learning Environment

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## Abstract

The quality of education and instruction is related to effective execution of educational and instructional activities and efficiency of these activities is related to how the class is managed. Considered to be the manager of the classroom processes and program, teachers are expected to effectively direct and manage various material and human resources for the accomplishment of the goals. The purpose of the current study employing survey method is to determine the effect of gender, the type of the faculty graduated and length of service on teachers' skills of managing the constructivist learning environment. The sampling of the study consists of 85 Life Sciences, Physics, Chemistry and Biology teachers working in schools located in the city of Muğla in the second term of 2014-2015 school year. As a data collection tool, The Scale of Management Skills of The Constructivist Learning Environment (SMSCLE) developed by Yıldırım (2012) was used. The teachers' skills of managing constructivist learning environments were examined through frequencies and percentages, whether these skills vary depending on gender and the type of the faculty graduated was investigated with t-test and whether these skills vary depending on their length of service was investigated through one-way variance analysis. At the end of the study, it was concluded that the teachers' skills of managing the constructivist learning environment are high and gender and the type of the faculty graduated do not significantly affect their skills. Yet, their managing skills vary significantly depending on their length of service

Keywords: Classroom Management, Variance Analysis, Science Teachers, Constructivist Learning Environment, gender

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## Introduction

Education means individuals' acquisition of information, skills and conceptions required for them to take their place in societal life and helping them inside or outside the school to develop their personalities (TDK, 2015). When the literature is reviewed, it is seen that there are different definitions of the term of education; however, there is an agreement among all these definitions that education is a unity of activities aiming to change behaviors or form new behaviors at desired direction (Başar, 1999). The quality of education and instruction is related to effective execution of educational and instructional activities. The efficiency of educational and instructional activities is related to how the classroom is managed. Arrangement of the learning environment and direction of the students through effective management of it are viewed to be the responsibility of teachers (Balci, 1993). Ways of acquiring and processing information by humans have always attracted the interest of scientists; thus, many different opinions have been proposed (Schunk, 2008). One of the most important theories trying to explain learning process is constructivist learning theory (Brooks & Brooks, 1999; Eryaman, 2007). Constructivist learning maintains that individuals construct newly acquired information by adding it to their prior information (Jones and Brader-Araje, 2002; Eryaman & Genc, 2010). Therefore, mean assignment in this learning system does not occur by means of direct learning rather by means of real life experiences (Yurdakul, 2004) or content-based experiences of the learner (Biggs, 1996). Therefore, the individual is seen as an effective person responsible for his/her own learning and selecting and processing the most suitable for himself/herself (Abbott and Ryan, 1999). Akgün (2005) stresses that instruction conducted on the basis of constructivist approaches will have some effects on interrelated concepts such as school management and classroom discipline because students developing democratic and multiple viewpoints, well-educated and having problem solving skills will turn out to be students who can defend their opinions and rights and get organized. In constructivist approach, teacher and student roles are different from those in the traditional approaches (Candar and Sahin, 2013). Classroom management can be seen as a process of setting the order as a whole and eliminating any disruption to the order (Burden, 1995). According to Candar and Sahin (2013) in instruction given on the basis of constructivist approach, the teacher mostly serves the roles of arranging the learning environment and counseling, thus feels to need to adopt classroom management practices different from the ones followed in traditional education. This new approach requires teachers to change their roles. For students to scientifically analyze events and to be individuals wondering, inquiring and questioning, science education is of great importance; thus, science teachers should have some qualifications. According to Akpinar and Ergin (2005), a teacher adopting constructivist approach;

- 1. Considers individual differences of students and encourages them to be successful through his/her supportive behaviors and offering them opportunities to express their opinions during the process of education and instruction.
- 2. Helps students to make direct observations so that they can gain permanent experiences by using interactive instructional materials as science subjects are closely related to close environment of students.
- 3. Uses a consistent and comprehensible language during the process of information exchange so that he/she can prevent possible misconceptions.
- 4. Prepares learning environments allowing students to demonstrate their creativity by drawing on the scientific terminology.
- 5. Helps students to acquire permanent information by leading them in the discovery of the information.

- 6. Establishes the setting needed for the realization of learning by enabling students to be in good interaction with their environment
- 7. Encourages students to make research by asking questions allowing them to use their acquired information.
- 8. Gives time to students to understand the question he/she has asked and then offers proper feedback.
- 9. Focuses on process rather than product while evaluating students.
- 10. Creates inter-disciplinary interaction by developing annual plans together with other teachers and implements course plans flexibly.

When the qualities of the teachers adopting constructivist approach are examined, it is clearly seen that they are different from the teachers adopting classroom management approaches used in traditional educational environments. Students can be more active and successful as a result of classroom management behaviors of teachers and thus, classes can be more productive (Kiraz and Omağ, 2013). Science teachers are the implementers of all the reform works conducted in the field of science. Evaluation of science teachers' perception of classroom management skills is of great importance for the development of efficient science education reform programs. Therefore, both the Ministry of National Education and universities organize trainings for teachers about the effective use of constructivist approach and classroom strategies and techniques to strengthen their classroom practices. Thus, it is believed that taking the opinions of teachers about the effectiveness of their classroom management in instructional settings where constructivist approach is employed is important. When the literature was reviewed, it was found that while female teachers most prefer to use the classroom management profile of "the one appreciated", male teachers most prefer "authoritarian" classroom management profile (Ekici, Aluçdibi and Öztürk; 2012). In environments where constructivist approach which has been quite popular in the last ten years in Turkey is adopted, it has been wondered whether gender of teachers leads to significant differences in classroom management practices. Moreover, when the literature is reviewed, it is seen that there is a positive correlation between the length of professional service and classroom management. Particularly, within the first years of professional career, teachers may be confronted with serious problems in classroom management (Taşdan and Kantos, 2007). Such teachers, as a result of failure they have experienced in classroom management, feel stressed and may think that they are unsuccessful in the profession of teaching (Sarıtaş, 2003). There is not enough research investigating whether there are significant differences between the classroom management practices of the science teachers trained according to traditional approach and those of the science teachers trained in line with constructivist approach following the adoption of constructivist approach in science education. Literature also reveals that there are significant differences between the classroom management practices of the teachers having graduated from science faculties and those of the teachers having graduated from education faculties. With the adoption of constructivist approach, the number of studies focusing on the type of the graduated faculty has decreased. Though there are some studies (Ada, 2000; Çınar, O., Temel, A., Beden, N. and Göcgen, S., 2004; Karaçalı, 2006; Cetin, 2013; Atıcı, 2014; Eker, 2014) looking at the effects of variables such as physical conditions of the classroom, classroom population and self-efficacy beliefs of teachers on classroom management, there is no such study dealing with the effects of these variables on teachers' skills of managing constructivist classroom environments; thus, future research may look at this issue.

The purpose of the current study is to investigate the effects of gender, whether having graduated from a science faculty or an education faculty and teachers' length of professional service on their skills of managing a constructivist classroom environment. The current study is believed to make valuable contributions to literature, as it will explore the extent to which constructivist approach-based activities are implemented in the class, to what extent teachers instruct in compliance with the principles of constructivist approach and what kind of learning process students are undergoing in the class.

Hence, the goal of the current study was set to determine the effects of gender, the type of the faculty graduated and length of service on their skills of managing the constructivist learning environment.

For this purpose, answers were sought to the following sub-questions:

1. What is the distribution of natural sciences teachers according to their skill level of managing the constructivist learning environment?

2. Do the natural sciences teachers' skills of managing the constructivist learning environment vary significantly depending on;

a) gender,

b) the type of the faculty graduated,

c) length of service?

#### Method

In the determination of the teachers' skills of managing the constructivist learning environment, survey method was employed. This method is a research model aiming to describe a state as it is or was (Karasar, 2006).

## Sampling

The sampling of the current study constructed by using purposive sampling method, one of the non-random sampling selection methods, consists of totally 85 teachers selected from among the Life Sciences teachers working at secondary schools in Muğla and Physics, Chemistry and Biology teachers working at high schools in Muğla in the second term of 2014-2015 school year.

#### **Data Collection Instruments**

In the current study, a personal information form developed by the researcher to elicit the demographic features (gender, the type of the faculty graduated and length of service) of the participants and The Scale of Management Skills of the Constructivist Learning Environment (SMSCLE) developed by Yıldırım (2012) were used as data collection instruments. Developed by Yıldırım (2012), SMSCLE is a 33-item five-point Likert-type scale (Never, Rarely, Sometimes, Often, Always). The score range of the scale is between 33 and 165. The levels of the skills of managing constructive learning environment were determined to be low, medium and high and the range interval was divided into the number of groups and thus, score intervals were determined. In this way, the level of the students getting a score ranging from 77 to 120 is set to be medium and the level of the students getting a score ranging from 121 to 165 is set to be high. The

internal consistency coefficient of the original scale is .94. The reliability coefficient calculated on the basis of the data of the current study was also found to be .94.

## **Data Analysis**

The data collected through the personal information form and SMSCLE were analyzed through SPSS 20.00 program package. Whether the teachers' management skills vary depending on gender and the type of the faculty graduated was investigated with t-test and whether these skills vary depending on their length of service was investigated through one-way variance analysis (ANOVA). The lowest score to be taken from the 33-item scale is 33 and the highest score is 165 and all the items are positive and scored as follows: Never: 1, Rarely: 2, Sometimes: 3, Often: 4, Always: 5.

### Findings

In this section, the collected data are analyzed with appropriate statistical techniques and the findings obtained are interpreted by tabulating them.

#### Findings related to first sub-problem

The first sub-problem of the study aims to determine the teachers' skills of managing the constructivist learning environment. In this regard, frequencies and percentages calculated for the teachers' skills of managing the constructivist learning environment are presented in Table 1.

Table 1. The teachers' skill levels of managing the constructivist learning environment

	Me	dium			Н	igh	
N	%	$\overline{\mathbf{X}}$	S	Ν	%	$\overline{\mathbf{X}}$	S
4	4.7	111.50	4.04	81	95.3	143.65	12.76

When Table 1 is examined, it is seen that 95.30% of the participants have high level of constructivist learning environment management skills and only 4.70% have medium level of these skills, their arithmetic mean is 143.65 and standard deviation is 12.76. None of the teachers was found to have low level of constructivist learning environment management skills.

### Findings related to the second sub-problem

The second sub-problem of the study is related to whether the teachers' classroom management skills vary significantly depending on gender. In this connection, t-test results for the teachers' scores taken from SMSCLE in relation to gender are presented in Table 2.

Gender	Ν	$\overline{\mathbf{X}}$	S	t	р
Male	41	135.46	12.13	-4 68	0.23
Female	44	148.36	13.30	-4.00	0.25

Table 2. t-test results for the teachers' s	scores taken from	SMSCLE in :	relation to gender
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As can be seen in Table 2, 41 of the teachers are males and 44 are females. The teachers' constructivist learning environment management skills do not vary significantly depending on gender  $[t_{(83)} = -4.68, p > .05]$ .

#### Findings related to the third sub-problem

In order to determine whether the teachers' constructivist learning environment management skills vary significantly depending on the type of the faculty graduated, independent samples t-test was conducted and the results are presented in Table 3.

**Table 3.** T-test results for the teachers' cognitive learning environment management skills in relation to the type of the faculty graduated

Type of the faculty graduated	Ν	$\overline{\mathbf{X}}$	S	Т	р
Education faculty	61	144.22	12.97	2.01	0.21
Science faculty	24	136.83	16.12		

As can be seen in Table 3, 61 of the teachers are the graduates of education faculty and 24 are the graduates of science faculty. The teachers' cognitive learning environment management skills do not vary significantly depending on the type of the faculty graduated [ $t_{(83)} = 2.01$ , p>.05].

#### Findings related to the fourth sub-problem

In order to determine whether the teachers' constructivist learning environment management skills vary significantly depending length of service, one-way variance analysis was carried out and the results are presented in Tables 4 and 5.

**Table 4.** Arithmetic means and standard deviations of the scores taken by the teachers from the scale of skills of managing the constructivist learning environment in relation to length of service

Length of service	Ν	$\overline{\mathbf{X}}$	S
1-5 years	7	150.86	13.13
6-10 years	18	132.89	12.64
11-15 years	22	142.10	15.91
16-20 years	20	138.40	11.28
21 years and more	18	152.22	8.97

In Table 4, it is seen that length of service of 7 teachers is 1-5 years, that of 18 teachers is 6-10 years, that of 22 is 11-15 years, that of 20 is 16-20 years and that of 18 is 21 years or more. That is, majority of the teachers have been working as a teacher for between 11 and 15 years. Arithmetic means show that the teachers having been working for 21 years or more have higher constructivist learning environment management skill scores than the teachers having shorter length of service ( $\overline{X}$  =152.22), (S=8.97). The teachers having been working for 6-10 years have the lowest mean score ( $\overline{X}$  =132.89), (S=12.64). The results of the variance analysis conducted to test whether the differences between the arithmetic means are significant are presented in Table 5.

**Table 5.** ANOVA results for the teachers' constructivist learning environment management skills in relation to length of service

Source of the	Sum of		Mean of			Significant difference
		Sd		$\mathbf{F}$	Р	
variance	squares		squares			
Between-groups	4181.94	4	1054.49			1-5 years - 6-10 years,
Within-groups	12850.36	80	160.63	651	000	6-10 years - 21 years or more,
Total	17032 31	84		0.51	.000	16-21 years and 21 years and
Total	17052.51	04	-			more

 $[F_{(4-80)} = 6.51, p < .05]$ 

The results presented in Table 4 show that there is a significant correlation between the natural sciences teachers' constructivist learning environment management skill scores and their length of service  $[F_{(4.80)}= 6.51, p < .05]$ . Namely, the teachers' constructivist learning environment skills vary significantly

depending on their length of service. In order to find the source of this difference, Scheffe test was conducted and the results revealed that the constructivist learning environment management skill level of the teachers having been working for 1-5 years ( $\overline{X}$  =150.86) is higher than that of the teachers having been working for 6-10 years ( $\overline{X}$  =132.89) and the constructivist learning environment skill level of the teachers having been working for 21 years or more ( $\overline{X}$  =152.22) is higher than that of the teachers having been working for 6-10 years ( $\overline{X}$  =132.89) and that of the teachers having been working for 16-21 years ( $\overline{X}$  =138.40).

## **Discussion, Results and Suggestions**

The findings of the present study conducted to determine the effect of gender, the type of the faculty graduated and length of service on natural sciences teachers' constructivist learning environment management skills can be summarized as follows:

It was concluded that the teachers' constructivist learning environment skill level is high. When the relevant literature is examined, it is seen that Turan and Erden (2010) conducted a study with the participation of 411 classroom teachers and reported that the classroom teachers' constructivist learning environment management skills are at good level. According to Özenç and Doğan (2007), the classroom teachers view themselves adequate in terms of teaching competencies expected in a program developed in line with constructivist approach. Aldrich and Thomas (2002), Y1lmaz (2006), Ağlagül (2009), Y1ldırım (2012), Çınar, Teyfur and Teyfur (2006) also reported similar findings in terms of the construction and organization of constructivist learning environments. However, Kaloç (2006) stated that elementary school inspectors reported that elementary school teachers have medium level of teaching competencies. Arslan, Orhan and Kırbaş (2010) found that school directors believe that Turkish language teachers can create low level of democracy in class as they sometimes have to resort to shouting and coercion. Dağlı and Sünkür (2012) aimed to determine the elementary school teachers' perception of their in-class behaviors on the basis of inspection reports and found that their perception is "sometimes". These results show that there is a difference between how teachers see themselves in the constructivist environment and how they are perceived.

It was found that the teachers' constructivist learning environment management skills do not significantly vary depending on gender and the type of the faculty graduated. Özdemir (2007), Özenç and Doğan (2007), Turan and Erden (2010) also reported that gender does not significantly affect teacher competencies within constructivist approach.

Özgan, Yiğit, Aydın and Küllük (2011) concluded that the type of the faculty graduated does not significantly affect teachers' learning environment management skills. However, Yıldırım (2012) conducted a study by using SMSCLE and concluded that the type of the faculty graduated leads to significant differences in sub-dimensions. Özenç and Doğan (2007) reported that the classroom teachers' constructivist approach competency levels vary significantly depending on the type of the faculty graduated in favor of the graduates of education faculty. Dündar (2008) found that the teachers having graduated from any faculty different from education faculty are more constructivist than the teachers having graduated the classroom teacher education departments of education faculties. These finding concur with the findings of the present study.

It was also found that the constructivist learning environment management skill level of the teachers having been working for 1-5 years is higher than that of the teachers having been working for 6-10 years and the constructivist learning environment skill level of the teachers having been working for

21 years or more is higher than that of the teachers having been working for 6-10 years and that of the teachers having been working for 16-21 years. The findings obtained show us that the length of professional service has positive effect on their classroom management skills. In literature there are some studies reporting similar findings. Uç (2013) stated that there are differences between the classroom management skills of teachers working for 20 years or more and teachers working for 5-10 years. Yıldırım (2012) found that the teachers' constructivist learning environment skills vary significantly depending length of service in favor the teachers having been working for 16 years or more. Özenç and Doğan (2007) also reported a significant difference between the teachers' constructivist approach competencies depending on length of service in favor of the teachers having been working for 21 years or more. Dağlı and Sünkür (2012) found on the basis of the perceptions of the elementary school inspectors that there is a significant difference between the classroom behaviors of the experienced teachers and novice teachers. Akın (2006) conducted a study on 77 teachers and found that classroom management skill levels of teachers working for 21-30 years are lower than those of the teachers working for 1-5 years and 1-10 years. Thus, it is seen that classroom management skill levels of teachers working for 6-10 years are higher than those of teachers working for 21-30 years. While Özmen (2003); Korkut and Babaoğlan, (2010); Turan and Erden (2010) reported similar findings in their studies, Yılmaz (2006) stated that length of service does not lead to a significant difference between the teachers' constructivist learning environment management skills. In a similar manner, Yalçınkaya and Tonbul (2002) determined that classroom management skills vary significantly depending on the length of service. The findings of these studies do not concur with the finding of the current study in terms of the length of service variable.

In light of these findings, following suggestions can be made:

1. Extending the research into different branches and regions can contribute to more in-depth analysis of the issue.

2. In-service trainings can be organized to improve novice teachers' constructivist learning environment management skills.

3. Research to be conducted with bigger samplings by using qualitative research methods can make important contributions to the literature.

In recent Science and Technology programs implemented in Turkey, it is recommended that teaching strategies should be determined by means of an approach making students active and putting them into center and learning environments should be designed in compliance with this approach (The Ministry of National Education, [MEB], 2005). Teachers are expected to design activities in line with the content of science and technology course and to provide guidance to their students during learningteaching activities. Therefore, both by The Ministry of National Education and universities, training programs should be offered to teachers to promote the effective use of constructivist approach and to improve their competencies to use classroom management strategies and techniques. A science teacher equipped with the skills required for the management of a constructivist learning environment can use educational technologies effectively, consider individual differences, promote students' creativity and thus, can provide opportunities for each student to learn equally and make the acquired information more permanent by encouraging students to discover and increase mutual interaction among students so that they can be more socialized. With the contributions of teachers having high level of classroom management skills, students will be more active in class and enjoy a fruitful classroom environment and in this way, students can increase their academic achievement and develop positive attitudes towards science classes

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## Effects of an SWH Approach and Self-Evaluation on Sixth Grade Students' Learning and Retention of an Electricity Unit

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### Abstract

The purpose of this study is to explore the effects of guided, inquiry-based laboratory activities using the Science Writing Heuristic (SWH) approach and self-evaluation on students' science achievement. The study involved three sixth grade classes studying an electricity unit taught by the same primary school teacher. Before the study began, one class was randomly selected to be the control group, and the other two classes were selected to be treatment groups. In the control group, students were instructed using a traditional didactic approach. Treatment groups engaged in guided, inquiry-based activities via the SWH approach. One treatment group was randomly selected to complete a self-evaluation of their SWH reports. Data collection tools included a baseline test at the beginning of the study to establish three skill-based groups and unit-based pretests, posttests, and retention tests. The Cronbach's alpha reliability of the electricity test was .91. Results indicated no significant mean differences among groups on pretest measures for the unit. Analysis of post and retention tests indicated that students in the SWH and self-evaluation SWH groups scored significantly higher than the students in the control group.

Keywords: science writing heuristic approach (SWH), guided inquiry, self-evaluation

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## Introduction

One of the purposes of science education is to raise individuals who are aware of their own cognitive processes and learn in a conscious style (National Research Council, 1996; Ministry of National Education, 2006); thus, metacognition plays an important role. Metacognition is described by Flavell (1979) as knowledge and regulation of cognitive activities by an individual during the learning process. Hewsen, Beeth, and Thorley (1998), on the other hand, defined metacognition as the possession of control over an individual's own knowledge and conceptual development. Viewed from this perspective, metacognition has a significant relationship with conceptual development, and both factors are integral to the nature of learning. Concrete metacognition skills may be revealed through a learner's statements and behaviors, such as activating prior knowledge, goal setting, time management, expressing non-understanding, commenting on one's own activities, relating answers to questions, recapitulating, and drawing conclusions (van der Stel & Veenman, 2010). Further, metacognition, which contains the processes of planning how to approach a learning task, then monitoring (Bağ, Uşak, & Caner, 2006), understanding, and evaluating it (Çakıroğlu, 2007), is a significant determiner of learning performance. Developing metacognitive skills is an important step forward in educational environments (Sungur & Senler, 2009; van der Stel & Veenman, 2010), where learners currently have few related opportunities.

Learning environments must be created where students are responsible for their own learning and deal with open-ended tasks (NRC, 1999; Sungur & Senler, 2009; Eryaman et al., 2010). This concept was explicitly stated when the Turkish education system was modified in 2005 and science was described as a manner of research and thinking based on experimental criteria, logical thinking, reasoning, and constant inquiry; it was also emphasized that providing various learning environments and experiences was essential (MNE, 2006). This study applied the science writing heuristic (SWH) approach of argumentation and inquiry, where students are responsible for their own learning, with the goals of making them more aware of their own cognitive processes and improving their metacognitive skills through self-evaluation.

The purpose of science education is not only to provide learners with scientific concepts; argumentation is also significant, for it explains how scientific discourse should proceed (Kuhn, 2010). Lack of argumentation leads to perceiving science concepts as a sum of static events (Zohar & Nemet, 2002). Cavagnetto (2010) suggested that argumentation is a significant language application of science, emphasizing how it plays a key role in the understanding and safe production of new knowledge. The role of argumentation is also major in acquiring socially constructed knowledge (Baker, 2009; Driver, Newton, & Osborne, 2000), and it can help learners to understand the process of socially constructing scientific knowledge better, since they are in constant interaction (Baker, 2009; Schwarz, 2009). In order for students to participate in scientific argumentations and make correct decisions, they need to understand the nature of such discussions and practice valid methods on scientific content (Schwarz, 2009). Argumentation is part of the inquiry process and becomes a center for learning science by providing interaction for both the individual and the group. Driver et al. (2000) have strongly argued that argumentation is a central component of science education that will help students make decisions now and in the future through three fundamental formats: developing conceptual understanding (Dawson & Venville, 2010), understanding scientific epistemology (Nussbaum, Sinatra, & Poliquin, 2008), and enhancing research capacity (Kelly, Druker, & Chen, 1998; Kim & Song, 2006). Research is essential to the nature of science, and it is crucial for students to think and reason during the research and argumentation process (Newton, Driver, & Osborne, 1999). Scientific argumentation can be taught using certain templates (Cavagnetto, 2010) that promote actively researching concepts, such as in the 3, 4, 5, 7-E models (Barman, 1989; Ramsey, 1993) or Kolb's (1984) Learning Cycle. One of the templates used to achieve conceptual learning is the Science Writing Heuristic (SWH) approach. This study aims to

investigate whether embedding self-evaluation into the argument-based SWH approach makes it more effective on student achievement or permanence of learning.

## The Science Writing Heuristic Approach

Hand and Keys (1999) developed this approach to define the structure of scientific arguments in order to improve them in education. It consists of a framework to guide activities as well as a metacognitive support to prompt reasoning and writing about data. Further, the activities and metacognitive scaffolds seek to provide authentic, meaningful opportunities for learners (Hand, 2008). The SWH approach serves as a bridge between formal and informal knowledge in science and enables students to consider structure and collaboration in scientific activities, discussions, and concepts within the framework of explanation and interpretation (Akkuş et al., 2007). It forms an effective, learner-centered environment enhanced by written and oral argumentation (Hand & Keys, 1999; Keys, Hand, Prain, & Collins, 1999).

The SWH approach consists of two parts (Hand, 2008): a teacher template and a student template (see Figure 1). The teacher template includes suggested activities for teachers when using inquiry activities and emphasizes phases of negotiation to facilitate for students. The template for students directs them to generate questions, claims, and evidence and to compare findings with other sources, including peers, the Internet, or the textbook. The student template also encourages learners to reflect on how their ideas change during an activity, asking questions to prompt scientific thinking. Beginning questions are crucially significant in developing a scientific argument, shaping relationships among questions, claims, and evidence (Choi, Notebaert, Diaz, & Hand, 2007).

The Science Writing Heuristic, Part I:	The Science Writing Heuristic, Part II:
A template for teacher-designed activities to promote	A template for students
laboratory understanding	
Exploration of pre-instructional understanding	Beginning ideas – What are my
(e.g., individual or group concept mapping).	questions?
Pre-instructional activities (e.g., informal writing,	Tests – What did I do?
making observations, brainstorming, and posing	
questions).	
Participation in science activity.	Observations – What did I see?
Negotiation phase I – assigning personal	Claims – What can I claim?
meanings for science activity (e.g., writing journals).	
Negotiation phase II – sharing and comparing	Evidence – How do I know? Why am I
data interpretations in small groups (e.g., making a	making these claims?
group chart).	
Negotiation phase III – comparing science ideas	Reading – How do my ideas compare
to textbooks or other printed resources (e.g., writing	with others?
group notes in response to focus questions).	
Negotiation phase IV – individual reflection and	Reflection – How have my ideas
writing (e.g., creating a presentation such as a poster	changed?
or report for a larger audience).	
Exploration of post-instructional understanding	
through concept mapping.	

Figure 1. The two templates for the SWH: the teacher template and the student template

Language applications are the center of the SWH approach. Teachers support the learning of students at all levels by applying language applications to scientific inquiry. Norton-Meier (2008) has noted how this basic idea suggests that there is no science without language. SWH applications require language presentations via different modes (speaking, listening, writing, connecting, and visuals) and forms (fairy tales, letters, poems) to different audiences (Norton-Meier, Nelson, Hockenberry, & Wise, 2008). Norton-Meier (2008) also pointed out that individual and social thinking and writing take place within inquiry activities in the class environment, yet scientific argument is required for students to understand these activities by explaining their claims with scientific evidence. Being involved in scientific argument helps students to understand meaningful concepts and how science and people can work together to improve natural world development (Hofstein & Lunetta, 2004). As the SWH approach embeds science argument within inquiries undertaken by students (Hand, 2008), students need to understand argumentation to conduct this process. Therefore, the SWH approach is designed to provide scaffolding for purposeful thinking about relationships between question, evidence, and claims (Hand, 2008). Recent studies support this view (Hand, Norton-Meier, Jay, & Bintz, 2009; Nam, Choi, & Hand, 2010; Norton-Meir, Hand, Hockenberry, & Wise, 2008).

The SWH approach is a template used by learners who apply the procedures of inquiry, writing, critical thinking, conceptual understanding, and thinking about skills (Hand, Wallace, & Yang, 2004; Hohenshell, 2008). In addition, it helps teachers organize laboratory sessions and inform students how to write lab reports (Omar, 2004; Mohammed, 2007; Hand, 2008). Within this context, the SWH approach could also be called an alternative writing style that enables learners to think about and discuss science concepts. The approach contains various cognitive and metacognitive writing activities for science learning and enables students to connect data, methods, evidence, and claims; to formulate claims; and to blend processes such as support in writing (Hand et al., 2004; Hohenshell, 2008). Students will better understand concepts addressed in class when this approach is well planned and implemented (Keys et al., 1999; Omar, 2004).

Comparisons of the SWH approach with traditional styles have resulted in a better understanding of scientific concepts (Burke, Hand., Poack., & Greenbowe, T., 2005; Keys et al., 1999; Hand et al., 2004; Hsieh, 2005; Günel, Kabataş Memiş, & Büyükkasap, 2010; Nam et al., 2010; Schroeder, 2008; Kıngır, Geban, & Günel, 2012, 2013). Implementation of the SWH approach has helped students to improve conceptual understanding, meaning-making, and reasoning abilities as well as critical thinking.

## **Self-Evaluation**

Assessment in education should feature a formative style that measures the process, rather than a summative style focusing only on the outcome. Formative assessment can define potential in new education programs or when seeking to enhance or improve applications. It includes traditional teacher evaluation, self-evaluation, and peer evaluation. In the center of individual learning or in learner-centered cultures, learners are supposed to want to learn, be aware of their learning, and take responsibility for it (Sebba, Deakin Crick, Yu, Lawson, & Harlen, 2008). Student self-evaluation has been found to increase learning significantly (Özoğul, Olina, & Sullivan, 2008). Self-evaluation includes judging one's own achievements and learning process (Sebba et al., 2008). Taras (2001) has suggested that self-evaluation is crucial, as it promotes life-long learning, professional development, and effective learning. It should always be put forward and to ensure that students take it seriously, they should be informed how its fundamental purpose is to develop learning; evaluations should also be considered within this context (Davies, 2002).

Günel, Hohenshell, and Hand (2006) stated that metacognition is the center of self-evaluation. From a metacognitive perspective, students formatively deal with self-evaluating in accordance with

defined rules to indicate mastery in expressing their interests and revealing their inadequacies (Özoğul et al., 2008). They take responsibility for their own learning and personal success. In addition, self-evaluation helps students exhibit their own development (Olina & Sulivan, 2004), which is a potential to improving performance (Özoğul et al., 2008). In their quasi-experimental study, Andrade, Du, and Wang (2008) investigated the effects of writing a model, creating a list of criteria, and self-evaluation in accordance with a rubric using that criteria. They determined that self-evaluation based on a graded rubric related to high scores; it helped make sense of writing and, when used actively by students, created significant quality.

## The Study

Building from the literature, the main purpose of this study was to explore the effect on student achievement levels of the SWH approach with embedded self-evaluation compared to traditional teaching approaches. In the SWH approach, students engage in metacognitive activities (Hand et al., 2004). Under the Turkish education system, science lessons allow for students to experience an active process where they personally construct knowledge. Students are interested in hand-on activities and experiments, and they reach results rapidly in lessons employing the active SWH approach. They experience processes such as questioning, explaining, analyzing, recognizing support or opposition, reasoning, and mounting an argument. In addition, the SWH student template presents a non-traditional writing technique and reflects teaching by conducting reasoning processes. Thus, within the scope of the present study, a self-evaluated SWH group was formed in addition to the non-self-evaluated SWH group and control group in order to increase certain students' awareness of the process. Consequently, we explored the impact of each of the three implementations on student achievement.

#### Method

A mixed method design was applied to this study. The study—in which a quasi-experimental pretest and posttest model was used—was implemented in three different sixth grade classes. Researchers randomly selected two of these classes as treatment groups (one SWH and one self-evaluated SWH) and one as the control group.

## **Participants**

This study was implemented in three different sixth grade classes taught by a single teacher at a public primary school in the eastern part of Turkey. The students were generally of middle class socioeconomic status and consisted of 51 females and 57 males, totaling 108 students. One class was randomly selected as the control group (35 students, 18 males and 17 females) and the other two as treatment groups (37 students, 22 males and 15 females; 36 students, 20 males and 16 females). The teacher taught the same content in 40-minute classes four times a week. The teacher participating in the research had five years of professional experience but was applying the SWH approach for the first time. The teacher also had a master's degree in science education and was pursuing a doctorate at the time of the study.

### **Treatment and Control Groups**

#### **Treatment Groups**

Students in both treatment groups dealt with explorative, inquiry-based activities in a school laboratory environment and reported on their activities individually using the SWH student template. One treatment group also conducted self-evaluations according to a rubric prepared by the researcher. The implementation was carried out on an electricity unit, which was taught over six weeks (four course hours
a week). Students completed five guided-inquiry activities in small groups (four or five people) and took part in classroom discussions. In the introduction, the teacher attracted students' attention with an activity and provoked the question "Why?" Later, a class discussion was initiated that included all students. Students were provided with the opportunity to act independently within enhanced limits, to identify what they were curious about, and to reflect within their groups and as a class.

#### **Control Group**

Control group students received education via the traditional approach, where teachers gave information directly, as students listened and answered questions from time to time. A subject or theme was followed from a text book, and chapter questions were answered as individual activities. Control group students only watched activities carried out by their teachers in the classroom and conducted no individual or group experiments or discussion. When necessary, the teacher demonstrated experiments to the whole group.

## **Application Topic**

Electricity was selected as a research topic since it is a basic science topic across all levels of schooling (MNE, 2006) with large coverage and common misconceptions (Akdeniz, Bektaş, & Yiğit, 2000; Çepni & Keleş, 2006; Sencar & Eryılmaz, 2004). This study is limited to a single electricity unit. Basic subjects included concepts of conductors and non-conductors, simple circuits and series/parallel circuits, electrical resistance, and bulb brightness and resistance.

## **Data Collection Tools**

#### **Baseline Test**

Questions taken from the NEAPS (National Assessment of Educational Progress) and TIMMS (Trends in International Mathematics and Science Study) tests were used to investigate differences among the students' science achievement levels. The baseline test asked 4 chemistry, 6 biology, and 10 physics questions. This test was constructed by the SWH research team at Iowa State University, and its reliability was found to be .75 (Gunel, Akkuş, Hohenshell, & Hand, 2004). After the translation of the test, the researcher examined whether the questions were suitable for the curriculum content established by the Ministry of National Education, and two questions were removed. The test was examined by four specialized researchers in terms of suitability for curriculum and content validity, and corrections were made. Finally, another researcher in Turkish education was asked to examine the text in terms of semantics and orthography, and corrections were made once more. The final test consisted of 18 questions. It was administered to sixth grade students at a different 54 –people in the elementary school as a pilot study. The test's Cronbach's alpha reliability coefficient was .71. The final test was used to determine differences between students in terms of science achievement and to categorize students into groups (low, medium, and high science achievement). See Figure 2 for sample baseline test items.

# International Journal of Progressive Education, Volume 11 Number 3, 2015 $\ensuremath{\mathbb{C}}$ 2015 INASED



Figure 2. Baseline test sample items.

## **Electricity Pretest, Posttest, and Retention Test**

The content planned for the sixth grade unit (simple electrical circuits, conductor and nonconductor materials, resistance, bulb brightness) was taken into consideration as the test was prepared. A total of 20 questions were selected from an appropriate pool of multiple choice questions released by the National Standardized Tests. Conceptual questions were also prepared where students were asked to write sentences to demonstrate justification, developing arguments, reasoning, and explaining processes. Because this type of question was not common within the teacher's or school's current practices, the researchers balanced the demands of the research with the practical nature of working within the school system and limited the test to the following four conceptual questions:

- 1. The power fails while you are doing your homework at home. You need light in order to do your homework. Your mother says that there is only a wire, a battery, and a lamp that you can use. Can you provide light with these materials? How? (Explain the electrical circuit you make by drawing it.)
- 2. Your teacher wants you to create an electrical circuit on a wood ground. You bring it to school to show it to your teacher after you complete it. While you are preparing to demonstrate the circuit, you notice that the switch has been broken. What material(s) would you use to complete the circuit until you could insert a new switch? Why have you chosen those materials? Explain.
- 3. People around you consider you an electrical expert. How would you explain to them how a lamp produces light?
- 4. Ali calls the police and tells them that his child at home has been shocked as a result of an accident. When the policemen arrive, the child is lying on the floor next to a power outlet. He has a screwdriver in his hand and is wearing slippers. One of the policemen glances around, but he does not see anything metal near the child. Policeman: Is anyone else at home? Ali: No.

Policeman: Then arrest this man!

How did the policeman realize that Ali is the murderer?

Content validity (Balcı, 2004; Çepni, 2005; Karasar, 2004) of the electricity test was considered by five experts, and modifications were made. After this process, the test was administered to a group of 72 sixth grade students from an inner city middle school in the eastern part of Turkey. The inter-rater reliability was found to be .91. This finalized test was used as a pretest, posttest, and retention test, which was administered eight months after the original application. The answer key for the open-ended questions was prepared by a researcher with teaching experience in the subject area who also scored all responses. When randomly selected answer sheets were scored by another researcher and the teacher, inter-rater reliability was observed to be 90%.

### SWH reports and Self-Evaluation Rubric

When completing SWH applications, students in the experiment group prepared reports in accordance with the student template. This report had several parts: beginning ideas, where students wrote initial questions to research; test, where they experimented with their questions; observations, where they wrote about their findings; claims, where they asserted their opinions; evidences, where they cited resources; readings, where they compared and contrasted results; and reflections, where they indicated personal changes they experienced during the process. These reports were submitted after each activity.

A 4-point Likert scale rubric was prepared for students to evaluate their own SWH reports, named the self-evaluation rubric. The main purpose of this rubric was to help students improve their SWH reports. The researcher selected 12 criteria to define the rubric questions, and relevance was checked by another researcher with applications in this field. Criteria were revised in light of this review, and the self-evaluation rubric was finalized. Only one of the three groups applied this rubric to their SWH reports, and these evaluation scores were not used as data in the study.

#### Results

#### **Baseline Test**

Analyses indicated that group performances on the independent variable of baseline score were not statistically different (F(2, 98) = 2.980, p = 0.056; see Table 1 for M and SD distribution of groups).

Group Distribution and Baseline Test Scores					
Groups	n	М	SD		
Control	28	21.41	8.32		
SWH	34	25.85	8.38		
Self-evaluated SWH	35	22.37	7.95		
Total	97	23.30	8.35		

Table 1Group Distribution and Baseline Test Score

The researchers used this baseline test to establish groups based on achievement. Students were categorized as having low, medium, or high skill levels in relation to test scores. Scores one-half standard deviation around the mean  $(\bar{x} - \frac{1}{2}SD, \bar{x} + \frac{1}{2}SD)$  represented the medium achievement level, a score one-half standard deviation below the mean or lower  $(\bar{x} - \frac{1}{2}SD)$  and below) indicated low achievement level, and a score one-half standard deviation above the mean  $(\bar{x} + \frac{1}{2}SD)$  indicated high achievement (see Table 2). The overall total distribution of students was approximately equal for each achievement level.

		Achievement Level		
Group	Low (n)	Medium (n)	High (n)	
Control	10	14	5	
SWH	6	14	14	
Self-evaluated SWH	15	10	10	
Total	31	38	29	

## Table 2

#### Pretest

Analyses indicated that group performances on the independent variable of pretest total score were not statistically different (F(2, 106) = 0.310, p = 0.734). No other significant differences among classes were found (see Table 3 for *M* and SD distribution of groups).

#### Table 3

Group	Distribution	and Pretest	Scores
$O_{i} O_{i} v_{i} p$			000100

Achievement Level Distribution of Groups

Group	n	М	SD
Control	33	19.82	7.11
SWH	32	18.84	5.24
Self-evaluated SWH	34	19.32	6.00

## Posttest

Results showed significant differences among the groups on the posttest total score (F(2, 95) = 6.873, p < .01), where students in SWH group (M = 53.76, SD = 15.09) scored significantly higher than students in the control group (M = 39.59, SD = 14.33), t(63) = 3.88, p < .01; and students in the self-evaluated SWH group (M = 47.67, SD = 16.76) scored significantly higher than students in the control group (M = 39.59, SD = 14.33), t(63) = 2.09, p < .01). Significant differences were also found on the posttest total conceptual questions (F(2, 95) = 10.169, p < .01), where students in the SWH group (M = 22.30, SD = 9.22) scored significantly higher than students in the control group (M = 12.96, SD = 6.85), t(63) = 4.64, p < .01; and students in the self-evaluated SWH group (M = 20.12, SD = 9.74) scored significantly higher than students in the control group (M = 12.96, SD = 4.4, p < .01.

Analysis of the conceptual questions indicated significant differences among the groups on question 1 (F(2, 95) = 6.744, p < .01), where students in the SWH group (M = 8.67, SD = 2.39) scored significantly higher than students in the control group (M = 6.00, SD = 3.22), t(63) = 3.79, p < .01 and significantly higher than students in the self-evaluated SWH group (M = 7.18, SD = 3.13), t(64) = 2.17, p < .01. Significant differences were also determined for scores of conceptual question 3 (F(2, 95) = 7.966, p < .01), where students in the SWH group (M = 4.85, SD = 3.60) scored significantly higher than students in the SWH group (M = 4.85, SD = 3.60) scored significantly higher than students in the control group (M = 1.91, SD = 2.22), t(63) = 3.98, p < .01; and students in the self-evaluated SWH group (M = 1.91, SD = 2.22), t(63) = 3.98, p < .01; and students in the control group (M = 1.91, SD = 2.22), t(63) = 3.98, p < .01; and students in the control group (M = 1.91, SD = 2.22), t(63) = 3.98, p < .01; and students in the control group (M = 1.91, SD = 2.22), t(63) = 3.98, p < .01; and students in the control group (M = 1.91, SD = 2.22), t(63) = 3.98, p < .01; and students in the control group (M = 1.91, SD = 2.22), t(63) = 3.471, p < .01), students in the non-self-evaluated SWH group (M = 2.76, SD = 2.90) scored significantly higher than students in the control group (M = 1.06, SD = 2.37), t(63) = 2.59, p < .01; and students in the self-evaluated SWH group (M = 2.73, SD = 3.49) scored significantly higher than students in the control group (M = 1.06, SD = 2.37), t(63) = 2.26, p < .01.

Students were categorized into low, medium, and high groups in relation to their general achievement levels at the beginning of the study. Mean scores on the electricity unit posttest for these

three achievement groups are displayed in Figure 3. In the graph, the lowest mean among students in the low achievement group is within the control group, whereas mean scores of the treatment groups are similar and higher than those of the control group. In the medium achievement level group, the control group again has the lowest scores, and the treatment groups have higher mean scores. Among the two treatment groups, the mean score of the SWH group was higher than the mean score of the self-evaluated SWH group. Finally, scores among the high achievement level group were, from lowest to highest, control group, SWH group, and self-evaluated SWH group.



Figure 3. Distribution of Posttest Scores According to Achievement Levels

### **Retention Test**

For the retention test, significant mean differences were found among the groups on total score (F(2, 86) = 3.264, p < .01), where students in the self-evaluated SWH group (M = 44.46, SD = 16.09) scored significantly higher than students in both the non-self-evaluated SWH group (M = 35.97, SD = 12.89), t(59) = 2.29, p < .01, and the control group (M = 36.39, SD = 14.81), t(58) = 2.02, p < .01. Significant mean differences were also found on the conceptual questions' total score (F(2, 86) = 7.31, p < .01), where students in the self-evaluated SWH group (M = 20.19, SD = 9.64) scored significantly higher than students in the SWH group (M = 11.65, SD = 8.06), t(59) = 3.76, p < .01, and the control group (M = 14.32, SD = 9.54), t(58) = 2.37, p < .01.

Analyses of each conceptual question indicated significant mean differences among the groups on conceptual question 1 (F(2, 86) = 3.098, p < .01), where students in the self-evaluated SWH group (M = 7.13, SD = 3.40) scored significantly higher than students in the SWH group (M = 5.34, SD = 3.76), t(59) = 1.94, p < .01, and the control group (M = 5.11, SD = 3.21), t(58) = 2.37, p < .01. For conceptual question 2 (F(2, 86) = 4.801, p < .01), students in the self-evaluated SWH group (M = 7.5, SD = 4.02) scored significantly higher than students in the SWH group (M = 4.38, SD = 4.45), t(59) = 2.86, p < .01, and the control group (M = 4.64, SD = 4.70), t(58) = 2.60, p < .01. On conceptual question 3 (F(2, 86) = 5.110, p < .01), students in the self-evaluated SWH group (M = 3.53, SD = 3.10) scored significantly higher than students in the self-evaluated SWH group (M = 3.53, SD = 3.10) scored significantly higher than students in the self-evaluated SWH group (M = 3.53, SD = 3.10), scored significantly higher than students in the self-evaluated SWH group (M = 3.53, SD = 3.10) scored significantly higher than students in the self-evaluated SWH group (M = 3.53, SD = 3.10) scored significantly higher than students in the self-evaluated SWH group (M = 3.53, SD = 3.10), scored significantly higher than students in the self-evaluated SWH group (M = 3.53, SD = 3.10) scored significantly higher than students in the SWH group (M = 1.55, SD = 2.37), t(59) = 2.82, p < .01, and the control group (M = 1.68, SD = 2.50), t(58) = 2.56, p < .01.

Figure 4 shows mean scores of the retention test compared to general achievement levels of students in each group. Self-evaluating SWH students had the highest mean scores among the groups at all achievement levels.

International Journal of Progressive Education, Volume 11 Number 3, 2015  $\ensuremath{\mathbb{C}}$  2015 INASED



Figure 4. Distribution of Retention Test Scores According to Achievement Levels

#### **Cohen's d Effect Sizes on Posttest and Retention Test**

Cohen's d index is widely used in the social sciences. The use of d is not only a necessity demanded by the practical requirements of table making, but it proves salutary in those areas of the behavioral sciences where raw units are arbitrary, lack meaning outside the investigation, or both (Cohen, 1998). Cohen defined effect sizes as small (d = .2), medium (d = .5), and large (d = .8). We applied this analysis to better describe the differences among means. The effect sizes of the groups are given in Table 4. In the posttest, a small effect size was found on multiple choice questions among the control and SWH groups, and a large effect size was found on concept questions and total test score in favor of the SWH group. Between the control and self-evaluated SWH groups, a large effect size was found on concept questions in favor of the control group, whereas this effect was medium-sized for the total test score. Between the two treatment groups, a small effect size was found in favor of the non-self-evaluated SWH group on all three categories for the posttest. Similarly, on the retention test, between the control and SWH groups on multiple choice questions, the SWH treatment group had a small effect size, whereas the opposite was true for the concept questions. A small effect size was found for multiple choice questions between the control and self-evaluated SWH groups, whereas a medium effect size was found in favor of the self-evaluated SWH group on concept questions and total scores. Between treatment groups, greater effects were seen for the self-evaluated SWH group on concept questions and total score.

Measure	Groups	Cohen's d	Scale
Posttest MCQ	Control/SWH	.36	Small (SWH)
	SWH/Self-evaluated SWH	.35	Small (SWH)
Posttest CQ	Control/SWH	1.15	High (SWH)
	Control/Self-evaluated SWH	.85	High (Self-evaluated SWH)
	SWH/Self-evaluated SWH	.23	Small (SWH)
Posttest Total	Control/SWH	.96	High (SWH)
	Control/Self-evaluated SWH	.52	Medium (Self-evaluated SWH)
	SWH/Self-evaluated SWH	.38	Small (SWH)
Retention	Control/SWH	.32	Small (SWH)
MCQ	Control/Self-evaluated SWH	.31	Small (Self-evaluated SWH)
Retention	Control/SWH	.30	Small (control)
CQ	Control/Self-evaluated SWH	.61	Medium (Self-evaluated SWH )
	SWH/Self-evaluated SWH	.90	High (Self-evaluated SWH)
Retention	Control/Self-evaluated SWH	.52	Medium (Self-evaluated SWH)
Total	SWH/Self-evaluated SWH	.58	Medium (Self-evaluated SWH)

 Table 4. Cohen's d Effect Size on Posttest and Retention Test

#### **Discussion and Conclusion**

According to the results of the electricity pretest and baseline test, each group began with relatively equal achievement levels, and the low, medium, and high achievement students were distributed within each experiment group. When considering the posttest conducted at the end of the study, a significant difference was found between the SWH and control groups in favor of the SWH group for the conceptual questions total score and on the first, third, and fourth questions. On the retention test, on the other hand, which was conducted eight months later, no statistically significant difference was found between the control and SWH groups. However, during effect size analysis, the SWH group was found to be more effective with a small effect size compared to the control group on multiple choice questions. The open-ended conceptual questions were evaluated separately.

The purpose here is, in case of no difference in total scores, to determine if intervention elicited differences on a conceptual level. When findings were examined, conceptual differences were found strictly in favor of the treatment groups for each test. Thus, this approach develops conceptual understanding. The fact that there had been little difference on the retention test but a noticeable difference on the posttest indicates that this approach supports students' learning on a conceptual level (Keys et al., 1999). The short duration of the experiment may explain why these differences did not achieve high levels. The SWH approach requires students to think during the process, establish relationships among data, interpret data, and communicate conclusions upon connecting claim and evidence; all of these operations improve higher level thinking skills. While it is not appropriate to expect metacognition to be overly effective in short-term applications, for longer applications, significant differences such as those noticed on the posttest may also be observed on the retention test. The literature cites many studies where SWH applications made significant differences on posttest scores (Akkuş et al., 2007; Hand & Keys, 1999; Hohenshell & Hand, 2006; Kabataş, Günel, Büyükkasap, Uzoğlu, & Hand, 2008; Kabatas Memis, Günel, & Büyükkasap, 2009, Günel et al., 2010). The results of these studies are parallel to the results of the current study. Once students are able to pursue their interests, they are empowered; their motivation towards science comes alive through experiments they design and conduct. Science is no longer a hard subject, and as interest in learning increases, retention is successful. During the SWH approach, students become more cognitively and metacognitively engaged in the learning process. Not only did students indicate willingness to complete the heuristic, a cognitive activity, they also recognized that they were required to make connections between various elements of the heuristic, a metacognitive activity (Hand et al., 2004). Students engaged in asking questions, examining evidence, making claims, and comparing their claims and evidence with current scientific knowledge and peers' opinions. Thus, students used decision-making strategies.

During their self-evaluation process, after the completion of their reports, students conducted selfevaluations of their SWH applications using the rubric prepared by the researcher. These evaluations are not included in the quantitative data. The researcher did help students to ensure consistency and impartiality across the entire SWH process. Considering the posttest's one way ANOVA and effect size findings, as well as the retention test, the self-evaluated SWH group was more successful than the control group. On the retention test, the success of the self-evaluated SWH group compared to SWH group also became clear, and the long-term effect of self-evaluation was revealed. Self-evaluation helps students take responsibility for their own learning and improves individual achievement (Olina & Sulivan, 2004). In addition, self-evaluation is important for learners to be a part of the process, and it provides learners with an outside perspective on themselves (MNE, 2006). A learner notices personal inadequacies through selfevaluation and can correct them before they become permanent. When self-evaluation and SWH were conducted together, even after eight months, almost all learned knowledge was remembered, demonstrating that knowledge in this process is constructed to be more permanent. A similar study was conducted by Günel, Hohenshell, and Hand (2006). They investigated the effect of students' self-

evaluation on non-traditional writing activities as part of the SWH approach, and the self-evaluated group was more successful on posttest scores.

The number of students in each achievement group across all three experiment groups was approximately equal, denoting that classes were homogeneous on general science achievement. Detailed information based on mean scores has been presented in figures for each achievement level. These graphs show that students in the non-self-evaluated SWH group were more successful on the electricity posttest at all achievement levels; compared to the control group, they had higher means at medium and high achievement levels. This result was not repeated for the retention test. Among low and medium achievement level students, non-self-evaluated SWH students received the highest scores, whereas the self-evaluated SWH group received the highest scores for the high achievement level. This result indicates that metacognitive assessments are demanding and explicit instruction might be needed with regard to metacognition. Among students from all three achievement levels, the self-evaluated SWH group was the most successful on mean scores of the posttest. Therefore, self-evaluation for SWH reports was more effective at the high achievement level, since self-evaluation requires using metacognition and students on the high achievement level are better at using metacognition (Rivard, 2004). On the other hand, at the medium achievement level, for students to experience the process on a one-on-one basis considerably improves learning (Figure 3). Students at this achievement level are those who need support when in difficulty and succeed when helped. Therefore, students at this achievement level strongly benefit from SWH applications. The result in our study is parallel to Hsieh (2005), who observed that this application makes the maximum difference for students at the medium achievement level.

Writing is considered to be a tool in creating an argument by organizing information into an effective presentation from a basic theoretical perspective. Many studies have shown that writing activities can improve students' conceptual level understanding. In our study, we asked students to complete the SWH template, including the non-traditional writing activity. For all three achievement levels, self-evaluating students noticed their inadequacies earlier and were able to correct mistakes. High achieving students are generally more successful applying metacognition, which may explain the differences among the self-evaluated SWH group. A similar result was found by Rivard (2004), who stated that students with low achievement levels are better at peer discussions and therefore understand concepts better, whereas students with high achievement levels are better at writing than talking activities. This finding indicates that writing requires using metacognition. In addition, Wallace (2007) has emphasized that one of the most salient features of writing that may promote conceptual understanding is its potential to generate metacognitive thought. When learners write, they discover what they know and what remains a gap. Thus, metacognition is a form of learning produced by writing. On the other hand, Grimberg (2008) observed that high achievement level students use more alternative cognitive operations, although all cognitive categories (perception, making sense, and generalization) were utilized in reports by students from all three achievement levels in the current study. Students dealing with activities targeting the use of metacognition report increased success.

One of the components of the SWH approach is inquiry, which is crucial in reaching new knowledge. For students, being active has significant results, such as improving research skills and providing better understanding about the nature of science (Bilgin, 2009). Learning that is based on inquiry allows students to use scientific process skills and methods (Tatar, 2006). Thus, students learn science best by hand-on experiences when they not only conduct experiments but also work actively in planning, implementing, and evaluating the process. This approach, which allows students to construct knowledge built on previously learned information and express connections meaningfully, is quite appropriate for science classes. Survival of this inquiry process depends on language practices such as verbal expression and writing (Prain, 2007). In light of this study as well as existing literature, learning environments should continue to be analyzed through investigation of verbal and written language

practices and arguments mentally recorded by students. In addition, alternative evaluations should be conducted beyond self-evaluation of students.

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## An Action Research on Employing Constructivist Multi-Assessment Strategy in Teacher Education

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## Abstract

The purpose of this study was to investigate the effectiveness of utilizing the multi-assessment strategy through a constructivist learning atmosphere with regard to perceptions of the pre-service teachers. The participants were 98 third year (junior) pre-service teachers attending to classroom management course in a public university in Turkey. Action research methodology and mixed method were utilized to collect data in this study. The results showed that classroom management field was acknowledged very positively by the most of the pre-service teachers. The authentic activities utilized during the authentic instructions were positively recognized, although they admitted that all process was tiring and took long time. Although open ended questions yielded both positive and negative aspects, utilizing multi-assessment strategy was indicated mostly by the participants as highly effective. Findings indicated that employing constructivist assessment in teacher education may yield positive impacts especially when doing it learning by doing.

Keywords: multiple assessment, constructivism, teacher training, pre-service teachers

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## Introduction

It is witnessed to the fact that today's understanding of education and educational practices in schools are very different from that of older generations. The three traditional basics of education – reading, writing and arithmetic – are no longer sufficient to help learners to deal competently with the changing needs of societies. Gilligan (2007) cites the result of a survey indicating that most of the competitive companies and their leaders require people with applied skills and who have higher order thinking skills. From this perspective, schools have grown in significance to achieve much more than the production of information, or simply telling learners what to think. Therefore, the old style of drilling students through traditional methods and activities, and measuring their outcomes at the end of the process, are not considered as characteristics to be associated with an effective lifelong learning process (Eryaman, 2007).

Evaluation is an essential component of teaching and learning process in understanding whether students have learned, whether teaching has been effective, or how best to address student learning needs.

### Constructivist teaching-learning and evaluation process

Traditional assessments favor a previously set goals and objectives, and pass and fail system. This is based on an after-the-fact understanding, incorporating checking what the students have learned (LaBonty & Everts-Danielson, 1992). On the one hand, in this system, students and subject areas are isolated, facts are memorized, and testing is often far away from real life situations (Gagnon & Collay, 2006). On the other hand, constructivist assessment deals with the process of the learner's construction of his/her own learning and authentic learning experiences assist students in the development of appropriate and effective understandings (Wilson, 1994). Regarding the literature, it has been observed that constructivist and authentic evaluation approaches are critical in this paradigmatic transformation in education (Sylvia, 1999). Hargreaves, Earl and Schmidt (2002, p. 70) state that "changes in classroom assessment represent major paradigm shifts in thinking about learning, schools and teaching". Constructivist theory and practice in schools caused radical changes in teacher education programs for many years (Cochran-Smith, 2001). This approach allows teachers to make subjective judgments about learners' knowledge, figure out using a feedback system in the teaching process, and meet student needs reflectively (Hargreaves, Earl & Schmidt, 2002, Eryaman & Genc, 2010). Kyriacou (1993) indicates the need to monitor and evaluate students' educational progress, so that the teacher can understand whether the learning process has been successful. Therefore the evaluation process should be aligned with the methods of instruction (Gilligan, 2007).

Recent years have witnessed new, authentic, and alternative assessment systems as compared with the traditional systems (Birembaum, et. al., 2006; Coll, Rochera, Mayordomo & Naranjo, 2007). Educators state that a constructivist learning-teaching atmosphere focuses on developing higher order thinking and problem solving skills, and challenging multiple authentic steps that are needed to reflect multiple learner outcomes, through multiple assessment procedures (Abdal-Haqq, 1998; Akar, 2004; Bahar et al., 2006; Effie, 2004; Jadallah, 2000; Kesal & Aksu, 2005; Semerci, 2001; Stein, Isaacs, Andrews, 2004; Taras, 2001; Tynjälä, 1999).

In constructivist evaluation, the process is more important than the product: the teacher is not seen as the source of knowledge, but as the facilitator of it. As learning and assessment process in a constructivist classroom are embedded (Anderson & Puckett, 2003; Brooks & Brooks, 2001; Ganyon & Collay, 2006), the nature and content of the course fit very well into utilizing a multi-assessment strategy employing authentic tasks that reflect multiple learner outcomes. There is no comparison between students; learners are involved in the evaluation process; evaluation is related to activities in the classroom; evaluation helps learning and it considers multiple point of views. (Bahar et al., 2006; Boud, 1995; Dochy & Moerkerke, 1997; Effie, 2004; Jonassen, 1994; Kinnucan-Welsch & Jenlink, 1998; Marlowe & Page, 1998; Özden, 2003; Semerci, 2001;

Şaşan, 2002; Taras, 2001; Tynjälä, 1999). Jonassen (1994) also states that constructivist evaluation requires authentic activities, process-based inquiry, and goal-free, multi-assessment based procedures. Coll, Rochera, Mayordomo and Naranjo (2007, p. 787) also clarify that "the assessment system is based on a theoretical perspective linked to social-cultural constructivism, according to which assessment, educational help and learning are closely related."

Although constructivism is not a new phenomenon in the education world, it still took decades to have an effect on the Turkish education system. The Turkish Higher Education Council (YÖK) constructed new programs for teacher training institutions from the beginning of the 1998-1999 academic year. The Turkish primary curriculum was the first to be developed and advanced in terms of moving from a traditional, competitive, and teacher-centered approach into a learner-based constructivist one during the 2005-2006 academic year. We, as the educators, have witnessed a very long historical process of employing a traditional assessment system in teacher education, as well as at other school levels in Turkey. However, as the elementary and secondary schooling in Turkey recently began to utilize non-traditional instructional methods and techniques, the student evaluation process was also affected by the new system. Although the teachers have experienced certain difficulties, the new system, which includes authentic assessment processes, has the potential to become an integral part of the learning-teaching process.

There are research studies in Turkey aimed to evaluate the competencies of teachers concerning authentic assessment. These studies mostly revealed that teachers were not competent or somewhat competent in application of authentic assessment in classrooms (Akgun et. al., 2005; Mintah, 2003; Sağlam et. al., 2008; Yaşar et. al., 2005). In addition to these studies, Akar, Erden, Tor and Şahin (2010) conducted a qualitative study revealing that teachers still use traditional instruction and assessment procedures in their daily practices. According to a survey study (Çakan, 2004), teachers at elementary and secondary schools in Turkey were deemed "inefficient" in the student assessment process. Therefore, as the research (Dhindsa et al., 2007; Yıldırım, 2004) indicates the importance of student perception when they are responsible in their learning – as required by the constructivist approach – I decided to collect learners' opinions on the authentic assessment system by employing it.

#### **Rationale for the Action**

I strongly believe that the classroom life in teacher training institutions should offer experiences and activities that utilize real life situations in order that meaningful and purposeful learning occurs. Such an environment proves a challenge for pre-service teachers to bridge the gap between their experiences and the schools in which the students will be educated to become competent and critical citizens in society (Stein, Isaacs, Andrews, 2004). I deliberately selected the Classroom Management course since student teachers make unique contributions on this course, and it covers one of the major concerns of teachers when they start the profession. This course is offered to junior (third year) pre-service teachers in teacher training institutions in Turkey. It deals with the basics of student behavior, characteristics and functions of classroom context and physical environment, teaching rules, orders and routines, use of time in the classroom, communication, motivation and the teaching and learning process. In addition to that, personal experience has showed me that many pre-service teachers, when they were appointed teachers, have visited us in the Faculty in order to consult us, and learn how to react in the 'real life' classroom, especially for student evaluation. This course therefore seemed to me to be the most suitable one to be considered for constructivist assessment procedures. Stringer (2008) indicates that action research is deemed to be the best approach when the researcher aims to utilize constructivist pedagogy in the learning environment and to employ the multi-assessment strategy (Brooks & Brooks, 1993; Wiggins, 1997). The purpose of this study was to investigate the effectiveness of utilizing the multi-assessment strategy in a constructivist learning atmosphere with regard to the perceptions of the pre-service teachers. The following research question guided this research: What are the perceptions of the pre-service teachers with regard to employing multi-assessment strategy in the Classroom Management course?

## Method

As Stringer (2008) states, when teachers are asked to do research in their classrooms, they are horrified when thinking about the complex and sophisticated research instruments, analysis and theoretical results. However, action research is a unique systematic inquiry that aims to enhance our learning-teaching process in the classroom environment. In line with this crucial aim, action research was used in this study that benefited from a mixed method containing both quantitative and qualitative methods and techniques.

#### **Participants**

The participants of this research were 98 students, in two sections, enrolled on the Classroom Management course in the English Education department, in a public university in Turkey. Twenty one (21) (21.4%) of the pre-service teachers were male and 77 (78.6%) were female.

### **Instrumentation and Data Collection**

Firstly, I decided to develop an instrument (alpha coefficient: 0.77) to collect data from the students regarding the assessment activities in the classroom. It consisted of three parts. The first part of it collected demographic information related to pre-service students' gender and academic grade averages. The second part included 25 Likert type items related to students' opinions of the implemented classroom management course, based on multi-assessment strategy. The items in the questionnaire were rated on a 5-point Likert scale as follows: 1 – Strongly disagree ( $\bar{x}$ =1.00 – 1.80); 2 – Disagree ( $\bar{x}$ =1.81 – 2.60); 3 – Partly agree/Neutral ( $\bar{x}$ =2.61 – 3.40); 4 – Agree ( $\bar{x}$ =3.41 – 4.20), and 5 – Strongly Agree ( $\bar{x}$ =4.21 – 5.00). The last part of the questionnaire offered an open-ended items asking the pros and cons of utilizing multi-assessment based instruction in the Classroom Management course. Three experts within the field of curriculum and instruction checked the instrument

### **Data Analysis**

At the end of the action research, a questionnaire collecting pre-service teachers' opinions about the Classroom Management course that employed multi-assessment strategy was distributed. Quantitative findings from the questionnaire were analyzed descriptively. Mean values of the participants' responses were computed for each item. In order to make clear comments on the data, the mathematical mean intervals of the items were recalculated. For example, if the pre-service teachers indicated their responses with a mean score of 4.45, this was commented as 'completely positive'. Then all mean values were ordered from the higher values to the lower ones in a table. In addition to that, heir responses were analyzed using thematic analysis technique (Braun & Clarke, 2006; Miles & Huberman, 1994; Marshall & Rossman, 1995; Yıldırım & Şimşek, 2005).

Classroom Management is offered for four class hours (50 min. per class hour) per week throughout a semester and all activities were limited by 14 weeks. Within the frame of the study, a course outline was firstly prepared and it was delivered to the student teachers at the first course meeting. This informal first meeting session acted as the needs analysis for the action, and my intention to implement the course as process-based, appeared to fit into the needs of the learners very well. In this action research, the researcher suggested to the pre-service teachers a list of mostly Turkish, but some English, readings, documents, books, and selected websites. In the first week, as was explained earlier, the pre-service teachers were informed

about the course procedures. Some of the selected activities that were followed during the course were as below:

- -Sharing the pre-service teachers' experiences which they obtained during the previous field works a related to classroom management
- -Seminar activities & presentations
- -Analyzing Turkish and English articles and transforming them into academic posters
- -Guest school principal and his speech on discipline problems commonly faced in schools
- -Watching discipline related movies ("Stand and Deliver" (1988, directed by Ramón Menéndez) and
- "Dangerous Minds" (1995, directed by John N. Smith) & preparation of movie reports
- -Individual and collaborative analyses of selected cases related to discipline & motivation
- -Peer evaluation on classroom management plans
- -Submission of the portfolios

All grading was done in line with individual and peer assessment procedures, except for the second exam. A part of the second exam (30%) was done through a 40 item achievement test. The other part of this exam (70%) was also based on authentic activities. Their portfolios that contained the individual classroom management plans reviewed and partially assessed by peers, were substituted for the final grades and peer review.

#### Results

The following information is a summary of quantitative means of data collected from the pre-service teachers through the questionnaire with regard to their opinions on employing multi-assessment based strategy in the learning process (Table 1).

Table 1. Mean and Standard Deviation values Related to the Opinions of the pre-service reachers	Table 1	. Mean and	Standard Deviation	Values	Related to t	the O	pinions of t	he p	pre-service	Teachers
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		$\overline{X}$	SD
	Classroom management is an important field in the teachin profession	4.95	.221
	I believe that when in the professions, I will benefit from the classroom management course I took.	4.94	.241
	The information we take from this course will be beneficial in the field teaching during the last year	4.72	.533
	My confidence increased after taking the classroom manageme course	4.51	.721
	The case study analyses were a beneficial part of this course	4.44	.733
Æ	The movies that was shown in the course were enjoyable	4.42	.919
SITIV	After the course, we realized that classroom management has lin with various fields	4.39	.727
V PO	The portfolios that contained classroom management plans we beneficial	4.26	.977
VER	Powerpoint presentations and handouts of them helped us to lea the course better	4.22	.936
E)	Classroom discussions were beneficial in the course	4.19	.808
TIVE	Seminar and article analyses that were done in cooperative grou were beneficial	3.84	1.250
ISOd	Beforehand, I never thought that classroom management was a important	3.74	1.357

	Seminar activities helped me to better understand classroo management	3.73	1.031
	The multi-assessment strategy that the instructor followed in the course instead of the regular exams helped me to better understauthe classroom management	3.71	.952
	I understood after doing the seminar study that classroo management has important links with other fields	3.68	1.080
	The course hours $(2+2)$ were enough to understand the classroo management course	3.67	1.138
	Academic articles helped us to see what is being done in the field classroom management	3.65	1.016
	Employing multi-assessment strategy in the course provided justi & equal treatment in measuring student success	3.58	1.121
	Inviting guests to this course was beneficial	3.37	1.287
	The Classroom management course can be effective regardless considering the physical environment	3.21	1.177
	Consideration of the attendance for evaluation purposes of the course was good	3.20	1.478
DIUM	Academic articles & poster study helped me to understau classroom management	3.17	1.201
	Group activities of seminar and article presentations prevented n from showing my individual performance	3.03	1.432
	The Classroom environment should have been more studer centered in order to be effective	2.98	1.153
NEGATIVE	The Crowded classroom environment was an obstacle for effecti- course implementation	2.37	1.135

UNDECIDED

As illustrated in the Table 1, the following items were considered as very positive: teachers consider classroom management as an important field in the teaching profession after taking the course ( $\bar{x}$  =4.95); they think that they will benefit from the classroom management course in their future experiences in the profession ( $\bar{x}$  =4.94), and the information that pre-service teachers obtained through this course will be useful in their last year during their field experiences in schools ( $\bar{x} = 4.72$ ).

Pre-service teachers also indicated that their confidence increased after taking the course ( $\bar{x}$  =4.51). As pertaining to the authentic activities in the course, the case study analyses were beneficial ( $\bar{x} = 4.44$ ); the movies were enjoyable ( $\bar{x}$  = 4.39); the preparation of the portfolios that contained classroom management plans were beneficial ( $\bar{x}$  =4.26) and powerpoint presentations and handouts helped them to learn the course better ( $\overline{x} = 4.22$ ).

The following items were indicated as positive: the classroom discussions ( $\bar{x}$  = 4.19) and article analyses that were done cooperatively in the course were beneficial ( $\bar{x}$  = 3.84). Pre-service teachers stated that beforehand, they never thought classroom management was so important ( $\bar{x} = 3.74$ ); seminar activity helped them to understand the classroom management better ( $\bar{x}=3.73$ ); multi assessment strategy followed by the instructor instead of regular exams helped them to understand the classroom management better ( $\bar{x}$  =3.71); they understood after the seminar study that classroom management has important links with other fields  $(\bar{x}=3.68)$ ; the course hour was enough  $(\bar{x}=3.67)$ ; academic articles were beneficial to see what is being done

in the classroom management field ( $\bar{x}$ =3.65) and employing multi-assessment strategies provided justice and equal treatment in measurement and evaluation ( $\bar{x}$ =3.58).

The following items were indicated as 'undecided': Inviting guests was beneficial ( $\bar{x}$ =3.37); classroom management course can be effective regardless of considering the physical environment ( $\bar{x}$ =3.21); consideration of the attendance for evaluation purposes in the course was good ( $\bar{x}$ =3.20); academic articles and poster study helped me to understand classroom management ( $\bar{x}$ =3.17); group activities of seminar and article presentations prevented them from showing their individual performance ( $\bar{x}$ =3.03) and the classroom environment should have been more student-centered in order to be effective ( $\bar{x}$ =2.98). Pre-service teachers, interestingly, stated that a crowded classroom environment was not an obstacle for the effective implementation of the course.

#### Strengthens and Limitations of the Multi-Assessment Process

This section presents the results of the two open ended questions asking for the pre-service teachers' opinions as related to strengthens and limitations aspects, and the three things most often remembered about multiple assessment based course implementation. Table 2 presents the results of the thematic analysis together with frequencies related to the strengthens and limitations of employing multiple assessment based course implementation.

Table 2

Themes & Frequencies on strengthens of multi-assessment based course implementation

### Activities:

- Multiple assessment (process) and its fairness (15)
- Benefits of group work & increasing cooperation and responsibility (11)
- Benefits of portfolio preparation process (10)
- Movies, visual aids, technology implementation (4)
- Contribution of projects and research studies to learning (4)
- The fair effect multiple assessment
- Case study analyses (2)
- Intensive practice in classroom management (2)
- Effectiveness of seminar and article presentations showing problems in classroom manageme field (2)
- Observing different methods of instruction (2)
- Fairness in student attendance (for final grades)

## **Characteristics of classroom management course:**

- Student centeredness % (9)and "real life" based course implementation (4)
- Being aware of the relationship between classroom management and other fields (3)
- Understanding that the classroom management is not just "discipline" (2)
- Instructors' effective teacher model (2)
- Didactic and the most beneficial course (2)

### **Course attainments:**

- Gaining insight and knowledge of the teaching profession (13)
- Developing research skills (12)
- Equal participation to the course (7)
- Increasing knowledge of the teaching profession (4)
- Permanent learning because of intensive course content (4)

- Learning empathy with students <u>Affective characteristics:</u>
- Entertaining course implementation (14)
- Effective communication with the instructor & fluency of the course (7)
- Recognition of motivation (6)
- Not having exam anxiety (3)
- Classroom environment
- Amusing classroom atmosphere (5)
- Intensive discussion in learning environment (3)

Note: Numbers of responses are shown within the parentheses

Firstly, I asked pre-service teachers to understand the strengthens and limitations aspects of multiple assessment based course implementation as pre-service teachers, if any. Then I organized the students' responses into two major categories: strengthens and limitations of the course implementation. The results of the thematic analysis yielded the following themes: activities, characteristics of classroom management course, course attainments, affective characteristics, and classroom environment.

With respect to the theme of 'activities', fair implementation of multi-assessment strategy (N=15), group work and its positive effect on cooperation and responsibility (N=11), and the beneficial process of portfolio preparation process (N=10) were all heavily flagged up by the pre-service teachers. Other responses, with regard to the positive aspects of the multiple assessment strategy, were stated by the participants in Table 2. Regarding the 'characteristics of the Classroom Management course' theme, nine pre-service teachers stated that student centered instruction (N=9) and real life-based implementation (N=4) were also positive aspects of the course. Besides, they were aware of the multidisciplinary construction of the Classroom Management course (N=3). Although many pre-service teachers stated the following sentiments with similar quotations in their responses, one of them indicated their gains as below:

I learned a lot of theoretical knowledge and practical tactics that I will surely use during my professional life. My self-trust increased. I was also very impressed to follow the course instructor who fulfilled all theory into practice as an effective model.

Related to the 'course goals and attainments' theme, thirteen pre-service teachers indicated that they gained insight and recognition of the teaching profession. They also stated that the course developed their research skills (N=12) as well. The following quotation was observed in many students' responses to the first open ended question: "This course is the most important pedagogical course I have ever taken".

One of the crucial themes found in the responses of the participants was the 'affective aspects of the course'. Pre-service teachers indicated that the entertaining course implementation (N=14), effective and comfortable communication (N=7), and understanding the importance of motivation in students (N=6) were the most positive aspects. Six students also went on to state that they never had exam anxiety because of the implementation of multi-assessment strategy. Participants stated that the classroom environment allowed for creating an amusing classroom atmosphere (N=5) and for free discussions (N=3) related to the topics.

Although the responses of the pre-service teachers yielded a theme of 'activities' positively received, limitations of the same theme were also indicated by them, such as allocating most of their times to the projects and task only in this course (N=44) and facing up to the difficulties of group work (N=18).

Table 3

Limitations of multi-assessment based course implementation

## Activities:

- Allocating too much time for the projects and tasks (44)
- Debates / difficulties / non-communication in group-works (18)
- Frequent use of technology in the presentations (10)
- Exhausting portfolio preparation process (9)
- Group-works prevented them from showing actual individual performances (6)
- Not having traditional testing (2)
- Lacking activities toward the KPSS (central teacher qualification exam) in the course
- Characteristics of classroom management course
- Grading the student attendance (6)
- Being in a hurry in the activities because of lack of time (2)
- Limiting such an important course with one semester **Affective characteristics:**
- Increased anxiety because of multiple assessment Classroom environment
- Crowded classroom size and difficulty of managing the classroom

Note: Numbers of responses are shown within the parentheses

Some pre-service teachers (N=6) did not like the fact that their attendance was taken into account when grading their success, and two pre-service teachers stated that they were always in a hurry to catch up with the activities in time. Although most of the pre-service teachers stated that multi-assessment strategy decreased their anxieties toward testing, a pre-service teacher indicated as opposed to this view. Lastly, a student indicated that classroom size and difficulty of managing all people in the classroom where a lot of activities had occurred was a handicap in terms of 'classroom environment' theme.

## **Discussion and Conclusion**

Since constructivist approach employs multiple criteria and viewpoints (Jonassen, 1994; Semerci, 2001), this study aimed to teach the use of effective and authentic assessment procedures that reflect nontraditional instructional implementations, through employing a continuous assessment understanding. This action research study clarified that utilizing multi-assessment strategy within process-based instruction appeared to yield a highly positive impact on pre-service teachers. The results can be discussed within the framework of 'positive' (pros) and 'negative' (cons) aspects. These were the main umbrella categories of the themes derived from the perceptions of the pre-service teachers as related to the utilization of multiassessment strategy in the course. In our study 'very positive' and 'positive' responses were collected from the pre-service teachers for the classroom management field, mainly in the teaching profession. The preservice teachers recognized the importance of an interdisciplinary course in their future career in the teaching profession. Moreover, although it was a tiring process both for teachers and students, qualitative results showed that utilizing multi-assessment strategy decreased test anxiety of the pre-service teachers, as was stated by some participants. These findings are similar to Doğan and Kaya (2009), and Gündoğdu's (2010) studies, which found that using authentic instruction and assessment improved the attitudes of pre-service teachers toward their tasks, and decreased their test anxieties. Students were sometimes involved in peer check, and peer assessment sessions in the classroom. At first, although many pre-service teachers seemed to be unwilling to be a part of such activities, they indicated through the open-ended questions that they gained self- and mutual trust through the assessment process. Black & William (2003) also report a positive reaction

from students, when students had an opportunity to receive feedback from peers. Research on student involvement in assessment process indicates positive perceptions by the students and teachers (Elkhader, 2008).

There is also ample positive research on the effectiveness of utilizing a portfolio system in educational settings (Aytunga, 2008; Bailey, 1997; Ediger, 2000; Ersoy, 2006; Ocak, 2006). In our study, although many students similarly asserted that the portfolio preparation process taught them a lot in preparation for their future career, a similar number of pre-service teachers mentioned that they were overwhelmed by this process, as was also found by Akar (2004). Obviously, it was a tiring process that gathers together all the work, however this process also taught them about the contemporary side of the profession. There is also ample research on teachers' awareness of the benefits of authentic assessment (Bekiroğlu, 2008; Elharrar, 2006; Yseldyke & Olsen, 1999). However, as parallel to the findings in our study, there are also concerns about the amount of time spent on this, the burden, inadequate knowledge of how to assess students, and crowded classrooms; (Aschbacher, 1994; Lawrence & Pallrand, 2000; Meyer & Tusin, 1999). Although a positive appreciation of the course has been observed, the heavy burden of the pre-service teachers during the semester, such as assignments, individual projects, group works, movie reports and portfolio preparation caused them to be tired of the multi-assessment strategy.

Teachers have difficulties with student assessment. The results of a survey study (Sylvia, 1999) showed that high school teachers' views of their pre-service assessment training lacked. Besides, this research indicates that designing and implementing traditional assessment techniques rated highest, and training in authentic assessment methods ranked lower. These results show us how training teachers in authentic assessment in their pre-service education is important. Teacher educators should benefit from multiple applications of assessing student behavior, and they teach how to do that in practice through a 'teaching by doing' system during the pre-service teacher training process. Since this study is an action research, experimental studies may be designed to measure the effect of utilizing multi-assessment strategy on students.

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Women Educational Leaders' Narratives: The Dynamics of Service Learning on Training and Transformation

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### Abstract

Service learning strengthens all involved: Students, faculty members, the community, and higher education institutions. Benefits of service learning for students include gaining real world experiences, personal and transformative outcomes (Conway, Amel, & Gerwien's, 2009), as well as higher order thinking from reflection on the experience (Molee, Henry, Sessa, & McKinney-Prupis, 2010). To understand the dynamics of service learning upon students' learning and transformation, this narrative case study chronicles women educational leaders' service learning and transformative experiences during doctoral study. These personal narratives are contextualized by the faculty member's service learning pedagogy and the types of service learning projects chosen. Data collection and analysis are achieved through reflective writing and journaling (Richardson & St. Pierre, 2005). A summary of results reveal the importance of service learning for students' academic and professional growth at the doctoral level, as well as the possibility of long-term benefits of service for the community and the transformation of leaders. Results also give faculty members and higher education support services insight into the design and delivery of service learning courses.

**Keywords:** service learning, reflection, transformative learning, personal narrative, higher education, women, leadership, teaching

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## Introduction

In an effort to extend citizenship behavior beyond the walls of educational institutions and into the community (Parker, Myers, Higgins, Oddsson, Price, & Gould, 2009), faculty members incorporate service learning into their students' coursework. As a pedagogical strategy, service learning entails students applying concepts from their coursework to a service activity to meet a community need while learning from experience and earning academic credit (Correia, Yusop, Wilson & Schwier, 2010; Fiddler & Marienau, 2008; Parker, Myers, Higgins, Oddsson, Price, & Gould, 2009). The student selects a community organization (e.g., health clinic, a university department, a school, a local branch of a nonprofit organization) and voluntarily completes work for them. These organizations act as service learning partners, linking the student from the classroom to the real world.

We intend to explore the outcomes of service learning for doctoral students of an educational leadership program. Our work employs components of service learning, reflective inquiry, and transformative learning as conceptual frameworks. The following describes each of these frameworks.

### Service Learning

With a focus on real-world experience, service learning differs from authentic learning in that the former involves the student acting as project manager or partner rather than (as in the latter) the instructor acting as a project manager (Correia et al., 2010). Similar to experiences of authentic learning, service learning can result in personal and transformative outcomes for students (Conway, Amel, & Gerwien's, 2009). In particular, Conway and his associates' (2009) meta-analysis found that service learning students improve their academic knowledge, and to a lesser degree, personal and citizenship outcomes. Molee, Henry, Sessa, & McKinney-Prupis (2010) found that students nearer the end of their degree program demonstrated greater depth of learning and critical thinking than freshman. Some other outcomes for these students include demystifying their chosen profession and an increase in self-efficacy towards their prospective work (Correia et al.), including in the distance education modality.

Real world benefits for the students are not achieved without effort. Rarely does practical experience offer sequential or clear conceptual instructions for completing tasks. Therefore, students rely on instructors to close the gap between the textbook and real world application of course concepts. Instructors face the challenge of limiting student burnout, fostering a team approach to service learning, balancing the need to control with allowing the student to "blunder through" the project, creating diversely skilled teams or permitting team selection (Correia et al., 2010, p. 10), and deciding whether to allow unintended consequences of the process for reflection (such as the perpetuation of stereotypes) or to challenge such unintended learning (Fiddler & Marienau, 2008). For these reasons, service learning pedagogy demands more time and emotional energy than traditional teaching (Correia et al. 2010).

Intending to benefit the community and students, service learning projects require an exchange of resources. The partnership strengthens the network and relations between two organizations, the service learning partner and the educational institution or other institution. Students, with guidance from instructors, must work with service learning partners to negotiate the scope of projects and provide strong customer service, in order to complete projects to the service learning partner's satisfaction (Correa et al., 2010). Communities not only reap volunteering students' labor but also the knowledge the students bring from their coursework. In exchange, service learning produces moderate positive changes in social awareness outcomes, as students improve their knowledge, beliefs, and attitudes about their service-learning partners (Conway et al., 2009). In addition, service learning fosters the value of volunteerism as part of students' professional development repertoire (Parker et al. 2009).

Valuing the volunteer experience stems from reflecting on its personal and societal benefits. Service learning pedagogy also often entails students reflecting and reporting on the service work accomplished (Conway et al, 2009; Molee et al., 2010).

#### Reflection

Reflection involves building on prior knowledge or experiences and drawing conclusions to make meaning from it (Fiddler & Marienau, 2008). Structured reflections generally produce greater outcomes than non-structured reflections (Conway et al., 2009). Instructors guide students through structured reflections, which can involve reporting and responding, relating, or reasoning and reconstructing of their service learning experiences. Another type of structured reflection involves the DEAL model: Describing the experience, examining the experience in relation to course objectives (that involved academic, personal, and civic learning components), and articulating learning achieved (Molee et al., 2010). As a result of extended guided reflection through writing, adult learners can better understand their own work, relationships, community involvement, and lives (Stevens, Gerber, & Hendra, 2010).

Reflection fosters higher order thinking and, at minimum, requires the learner to identify their experiences and make meaning of it. Yet Molee et al. (2010) found that students demonstrated lower order thinking (i.e., identifying, describing, and applying learning) and poor to fair critical thinking in their reflections. In contrast, Stevens et al. (2010) found that extended reflective processes enabled adult learners to apply knowledge beyond the classroom and expand their critical thinking. Methods of the two studies, however, differed. Stevens et al. conducted an e-mail study of adult learners who completed a prior learning portfolio within the previous three years. The adults had time to apply the knowledge they gained from their reflections, whereas Molee et al. analyzed students' reflection products of two service learning undergraduate courses. Explaining the barriers to higher order thinking skill development in service learning reflections, Fiddler and Marieanau (2008) espoused that a student can reflect only on their cognitive and affective experiences filtered by the attention they give to an event. Actual reflection involves interpreting the experience through one's own or others' theories, roles, and ideas, thereby engaging students in meaningful learning.

Through the process of reflection emerges deep understanding or higher order thinking (as illustrated in Bloom's hierarchical taxonomy domains). Such levels of knowing go beyond perceiving different perspectives and contexts, towards improving personal theories (Bereiter & Scardamalia, 2005; Eryaman, 2007). Besides cognitive progress from reflection, the learner can also gain psychologically, connecting their experience to their feelings to improve their interpersonal and intrapersonal skills (or emotional intelligence) (Taylor, Fischer, & Taylor, 2009). Fiddler and Marieanau (2008) explained that students' meaningful learning in a service learning context, if applied, has the potential to influence the event (or service learning activity), thus beginning the learning process again. Reflection "has the capacity to change the learner's perspective on the meaningfulness of the experience" (Stevens et al., 2010, p. 401). If such deep learning and interaction with the learning environment occur, then the learner will have had a transformative experience through reflecting on the service learning project.

### **Transformative Learning**

An internal metamorphosis defines the experience of transformative learning. In this process, the learner changes their old, perhaps neglected, frame of reference. This changes his or her basic personality to inclusive yet discriminating and open yet reflective, thereby strengthening emotional capacity and authentic discretion to guide action (Eryaman & Riedler, 2009; Ciporen, 2010; Stevens, Gerber, & Hendra, 2010). Thomas (2009) referred to transformative learning as a form of pedagogy that involves both problem solving and critical thinking, teaching students how to think rather than what to think. In

addition, Taylor, Fischer, and Taylor (2009) acknowledged the cognitive and emotional aspects of transformative learning, advocating for transformative curriculum to address the five factor model weaknesses specific to each gender (e.g., Openness and Agreeableness). For instance, to help males increase their emotional intelligence, they suggested applying a curriculum that teaches "emotional awareness, empathy, and interpersonal adeptness," and for women, applying a curriculum that "fosters the abilities of self-confidence, optimism, and ability to handle stress," thereby maximizing learning opportunities for students (Taylor et al., 2009, p. 28).

Curriculum fostering personal discovery challenge students to internalize and attach meaning to new concepts or information, resulting in dramatic changes in how students view themselves (Stevens, Gerber, & Hendra, 2010). For example, using the pedagogy of service learning and a reflection log, preservice teachers demonstrated quality learning with a majority reflecting through four lenses of transformational learning: technical, cultural, political, and post-modernist/postructuralist (Carrington & Selva, 2010). Because Stevens et al. found that most students who engaged in a reflective form of learning gain informative rather than transformative learning; they surmised that transformative learning depends on how ready students are in their lives for change when they start the learning process. This transformative process can be very fulfilling to students as they discover their capacity to change and gain self-confidence (Stevens et al., 2010).

Although students experience this process internally, they also gain an ability to apply their newly acquired knowledge and skills. Transformative learning affects the leaders' capacity to overcome obstacles, influence organizational outcomes, and demonstrate their knowledge and interpersonal capacity (Ciporen, 2010). Those experiencing personal transformative learning, compared to those who did not see more support (e.g., the love of learning and supportive colleagues) and barriers to implementing their new skills (e.g., lack of time or organizational resistance to change); generate greater outcomes and ways to overcome barriers with others (Ciporen, 2010). The leader, thereby, can transform their work environment in a pro-social way by transformational decision making.

#### Methods

## The Narrative Approach

An exploration of the dynamics of the service learning experience is needed to better understand students' experiences, learning, and outcomes in context of instructional pedagogy. We believe that understanding the dynamics of service learning through narrative help us to explore the outcomes of service learning, reflection, and the possibility of transformational learning experiences, especially among women educational leaders. Content analysis of course material, reflective writing, and journaling serve as the data for this work. Themes were extracted to summarize the findings.

#### **Participants**

To understand the outcomes of service learning, this narrative case study chronicles women educational leaders' service learning experiences in the context of the professor's service learning pedagogy. Educational leaders are defined broadly to include those who influence others in the field of education. The participants are leaders in educational positions and were enrolled in an Educational Leadership, Policy and Law doctoral program. They reflect on how their service learning experiences shaped their learning and practice by answering open-ended questions that served as prompts for focused reflective journaling.

# International Journal of Progressive Education, Volume 11 Number 3, 2015 $\ensuremath{\mathbb{C}}$ 2015 INASED

Participants include three students within the context of the professor's pedagogy, all of whom are female. Two students are Caucasian. One student and the professor are African American. All participants are U.S. citizens.

## **Purpose and Research Question**

Through active participation in the service learning project and reflective journaling, the students underwent an experience to foster deep learning that could possibly result in transformative learning. The purpose of this study is to explore the outcome of service learning for doctoral students of an educational leadership program. The overarching question is: What is the outcome of service learning during doctoral training? From this overarching question and a review of the literature, sub-questions emerged and were posed to participants, as follows:

- What efforts were exchanged between you and your service learning partner?
- What resulted from the service learning experience for you and the service learning partner?
- How did your service learning reflections contribute to your academic learning, thinking, socioemotional growth, and behaviors?
- To what extent was your old frame of reference, personality, way of thinking, or view of yourself changed by the service learning experience?
- Have any aspects of your life have changed as a result of the service learning project?

#### **Data Collection and Analysis**

Participants answered the sub-questions that pertained to their service learning experience. Their answers are written in narrative form derived from the content analysis of the course materials and personal service learning reflective journaling (Davis, Coffee, Murphy, & Woods, 2014) required for their course projects. This qualitative method uses a personal narrative approach by which participants reflected on their specific life experiences (Reismann, 2011; Richardson & St. Pierre, 2005), particularly their doctoral service learning project and its outcomes.

These narratives serve as sources of data collection for analysis. As a method of data collection, the narratives document the experiences of the participants. "The product [of data collection] cannot be separated from the producer, the mode of production, or the method of knowing." (Richardson & St. Pierre, 2005, p. 962) As a method of analysis, the personal narratives are used as a method of inquiry into the outcomes of service learning. In this way, writing is used as a form of thinking, discovering, and inquiry to construct knowledge (Richardson & St. Pierre). Analyzing these personal narratives also involves placing the stories in personal (and professional) context (Creswell, 2007). Because the authors both express and process their experiences in their personal narratives, "data collection and data analysis cannot be separated" and there is no model for this type of experimental writing (Richardson & St. Pierre, 2005, p. 971). Nevertheless, the researchers summarize the qualitative data by uncovering common and disparate themes across narratives and triangulating their findings (Creswell, 2008).

The following offers the faculty members' narrative to set the context for the students' course experience. We then feature the student narratives in addressing the aforementioned research question.

### **Personal Narrative: Doctoral Faculty Member**

The theoretical integration of Freire's Pedagogy of Freedom and Bloom's Taxonomy of Learning provide the foundation for my teaching (Davis, 2014). Freire's Pedagogy of Freedom holds the following: a) that teaching does not occur without learning from research, culture, and the students themselves; b)

that "to know how to teach is to create possibilities for the construction and production of knowledge rather than to be engaged simply in a game of transferring knowledge" (Freire, 1998, p.49); and c) that to teach is a human act and a form of intervention in the world (Freire, 1998).

Bloom's Taxonomy of Learning includes three domains of learning (cognitive, affective, and psychomotor). Intellectual outcomes as illustrated in the cognitive domain are segmented into categories ranging from less complex levels of thinking to more sophisticated thought. These categories include a) knowledge; b) comprehension; c) application; d) analysis, e) synthesis; and the most advanced thought outcome of f) evaluation (Bloom & Krathwohl, 1956) or knowledge creation (Anderson & Krathwohl, 2001; Davis, 2014).

I have employed service learning consistently for over seven years as a faculty member; each time at the graduate level via either doctoral or master's level courses. I have witnessed phenomenal benefits to students from service learning projects. These benefits include job opportunities, expanded professional networks, development of grant writing skills, successful receipt of grants (one master's student received a grant to fund computers for a computer lab and another grant to fund a student garden), and the formation of a new program (a service learning student's community "Daddy and Me Program"). Through these activities my students have constructed, applied, and evaluated knowledge; reinforced course content; and made positive interventions in the world.

## Personal Narrative: Doctoral Student & Educational Leader 1

The partner for my service learning project is the Director of Professional Development for a public school system in the southeastern United States. The school system is the third largest school district in its state and consists of 59 schools, more than 32,000 students, and 4,500 employees. The 59 schools are made up of 32 traditional elementary schools, 10 traditional middle/junior high schools, 4 traditional high schools, 9 magnet schools, 2 alternative schools, and 2 special education centers. Of the 32,000 students, 85% are students of color (77% of those being African American) and 15% are Caucasian.

The director of professional development within the system is charged with providing highquality, on-going professional development programs with intensive follow-up and support for all personnel. In doing so, he must ensure that professional development in the system is aligned to teacher quality, leader quality, and professional development standards; as well as to meet the needs identified in the individual schools' and the system's improvement plans. I wrote for [my service learning] project a literature review and presentation about decision making and the importance of communication for our service learning partner.

After an interview with the service learning partner, together, we agreed on three focus areas for the literature review: The flow of information in organizations; the communication process, channels, and barriers; and the impact of communication on the decision making process. The results of the literature review were shared with my service learning partner in both a PowerPoint presentation and in a completed document.

This was my first experience with service learning projects, and I sincerely hope that it will not be my last. Not only did I enjoy completing the project and enjoy working with the community partner, but I also benefitted greatly from the completion of the work. It allowed me to learn more, learn it more deeply, and apply it immediately. I sincerely look forward to future service learning projects.

# International Journal of Progressive Education, Volume 11 Number 3, 2015 $\ensuremath{\mathbb{C}}$ 2015 INASED

I believe I provided the partner site with a resource they will draw upon for years to come. I also think I have given ideas to ponder which may generate creative solutions to decisions that may be made in the future. Not only was the partner provided with a guide for today, but also with ideas and perceptions to explore in the future.

The idea of working for such a large, established organization was daunting. I now feel that from my professional background, work experience, and the education I am receiving in the Educational Leadership program, I am prepared to do the type of work that the organization needs.

One of the things I learned about myself is that I am very concerned with pleasing others. Too often I caught myself dissatisfied with my work because I wanted to provide the partner with a cure-forall that ails the organization. I wanted the resource to be a perfect example for my partner to hold up for the entire world to see. I learned that I can only compile the literature that is available and do my best to apply it to the site's concerns. I am unable to single-handedly solve all the decision making difficulties of my partner. My partner was happy with the finished product that I provided, even expressing excitement over certain sections.

I was challenged by this assignment, used the knowledge gained, and applied it immediately to a real-world situation. It was a bit uncomfortable knowing the document I was preparing was going to be read and utilized immediately, rather than simply being read and graded, never to be referred to again. However, the challenge proved to be exciting, knowing that I was providing a service for an entity within my own community.

## Personal Narrative: Doctoral Student & Educational Leader 2

My service learning project involved collaboration between two of my cohort members in the Educational Leadership, Policy and Law program. We selected two admissions offices as partners. The aim was to deliver a professional development document about decision making in education.

My cohort members developed a qualitative survey to analyze our service learning partners' strengths, weaknesses, opportunities, and threats (SWOT analysis). From this analysis key needs were identified. My main role involved writing a literature review as a source to pull recommendations for an ethical process of decision making given the needs of collegiate admission offices. I also sorted through the SWOT analyses and collaborated with my cohort members to make recommendations to our service learning partners through a written manuscript.

We offered our theoretical, practical guide and MS-PowerPoint about decision making in collegiate admissions to our service learning partners. In this guide, I applied my consulting experience, as an industrial/organizational (I/O) psychologist, and the new knowledge gained from the decision making course. (I facilitate an I/O psychology course online and enjoy applying my organizational behavior knowledge.)

I have high hopes that through this project we offered guidance and structure for our learning partners, informing them how to make ethical decisions. I hope they will approach the decision making process with an informed point of view and with cogent arguments supporting their decisions.

The reflections contribute[d] to my learning and behaviors. By reflection on the service learning activity, I gained greater insights into the technological, political, and economic influences of decision making. Furthermore, I realized that through the interviews and SWOT analysis, very little could be ascertained about the reality of the group dynamics and political influences at the site. People fear

revealing such sensitive information. I realized that my research needed to generally encompass decision making practices in higher education management. Through reflection, I grew more confident in my ability to analyze information in a way that reflected our partners' needs, as the biggest challenge involved deriving practical advice for our service learning partner. Having not worked in collegiate admissions and with only limited experience as a consultant, I was surprised to find that my interpretation of the SWOT analysis and my recommendations from the literature review resonated with my team members on this project who had requisite knowledge as collegiate supervisors and who interviewed our service learning partners. Moreover, I realized the importance of working as a team to meet our service learning partners' needs. For this reason, I involved my team members in brainstorming recommendations for our partners.

The entire service learning experience changed me in some ways. My decision making abilities have been improved. I now carry as a mantra how we defined decision making in our guide. I see decision making as overcoming an ethical dilemma while putting students' academic interests first. This process involves seeking guidance from my professional community, as well as considering how my actions influence others' and are shaped by others on micro and macro levels. Likewise, I developed a greater respect for educational decision makers, having had a glimpse into the complicated array of decisions they make influenced by psychological, social-psychological, political, economics, and technological forces.

I look forward to incorporating service learning into an online classroom one day soon. I can see how this project would not only offer practical experience to the students, but also contribute to the community from whom the service learning partners would be chosen. As an added bonus, the project would offer professional development to the faculty member. The faculty member would be able to learn from their students' service learning projects, gaining insight into the practical application of concepts. This knowledge will help the faculty member deliver the content of their course in a more grounded way; something I could stand to gain in my own practice as a faculty member. Most important, the networking capacity that the service learning project offers is invaluable to both the student, who will have cultivated an important connection to the job market, and the faculty member, who will have resources to tap into for his or her courses.

My readiness for a life change from the service learning project was evident. I was in a transition period in my life; I still am. Having had two small children and a husband that planned to retire from the service, I enrolled in the doctoral program looking for a career path in higher education. I also teach online, which offered the flexibility I needed. I am right where I need to be in perfect time to be transformed by any learning project, particularly service learning because of its many benefits.

My life has not changed tremendously from the service learning project, but some of my interests were realized. My interest in service learning spawned my interest in innovative pedagogies, so I selected an internship site that nurtured that interest. I complet[ed] my doctoral internships with a teaching and learning center at a large research university. As part of my work there, I attended a class about facilitating service learning projects in the classroom.

## Personal Narrative: Doctoral Student & Educational Leader 3

We selected the college of business at a local university to serve. A strategic plan was prepared to help the college outline its road map for serving students for the next five years. Focus group interviews were conducted to determine the needs of stakeholders, including students, alumni, businesses, and governmental agencies in order to set goals and objectives. The vision of the college was obtained through interviews with college and university administration.

# International Journal of Progressive Education, Volume 11 Number 3, 2015 $\ensuremath{\mathbb{C}}$ 2015 INASED

The service learning partners received an actionable document that they can implement immediately to improve operation or attain the stated goals of the institution. As a doctoral student, I received tangible experience that crystalized the content presented in course work and theory.

Reflecting back on the interaction with each partner, I can see how the experience informed my studies and enabled me to apply theory in a real life setting. As educators, we grapple with concepts, but my partners have real people and issues that need to be addressed. We are not just creating an academic body of work; we are creating opportunities to improve processes in organizations that can have real impact on the bottom line of organizations and, more importantly, improve the quality of education and thus the quality of life for the people working in or matriculating at these institutions.

As an educator, I realized the value of hands-on activities to the degree that I have instituted service learning opportunities into my pedagogy and approach to teaching undergraduate students. I see how the simple act of doing can be much more fulfilling and a strong method for imparting knowledge than traditional methods of delivery. I now look for opportunities to help deserving organizations or departments, while giving my students the opportunity to use the content they have studied in my class and others throughout our program.

## **Summary of Findings**

The context comprised both the doctoral faculty members' pedagogy with a strong emphasis on knowledge creation and the descriptions of the service learning projects. In general, the doctoral students described their exchanges with their service learning partners and the outcomes in relation to academic learning, thinking, socio-emotional growth, and behaviors. Furthermore, the students described whether their old frame of reference, way of thinking, or views of themselves changed in any way. One also described her readiness for change resulting from the project.

Via theme development, we found strong evidence that service learning experiences contributed to academic and professional growth, some evidence of benefits for service learning partners, and some evidence of transformational learning for the students. All the students reported that their service learning projects enforced course content, offered higher level thinking, and increased students' interest in the application or study of service learning. It also enhanced their careers, specifically leading to career growth, career opportunities, or professional development. Some evidence of benefits for the service learning partners included a student receiving positive feedback for service from the service learning partner and two students suspecting that their work will have lasting effects upon their partners. Transformational learning occurred for one student who gained confidence in her skills. One reported attaining an understanding of self/inner psychological workings, and the other realized the value of working with a team. These results indicate the importance of service learning to graduate training, especially women educational leaders who strove to make a lasting difference for their service learning partners.

#### Discussion

The results add to the body of knowledge in teaching and learning in terms of the influence of service learning, specifically pertaining to graduate students who have a wealth of knowledge and experience from which to frame their service learning experiences.

Academic and professional growth emerged as a strong theme among these doctoral students and female educational leaders. The findings of higher level thinking reflected Sevens et al.'s (2010) findings about the effects of the reflective process for applying knowledge beyond the classroom and expanding
critical thinking among adult learners. Similar, Henderson and Brookhart (1997) found that doctoral students in a school leaders program employing service learning projects reported enhancements in existing and new knowledge, skills, abilities, and networks from their work with underfunded public institutions. Relationship building and connecting with others to make a difference, emerged as an important service learning outcome in studies of graduate students (Kelly & Miller, 2008; McCluskey-Titus, 2008). However, we found no evidence that professional skill attainment by students was influenced by age, contradicting findings in other studies (Lu & Lambright, 2010; Molee et al., 2010). Academic and professional growth as a benefit of service learning involves meeting new networks of people and building on existing professional knowledge and skill-sets in real world application to develop and realize new skill-sets, thereby improving students' competencies.

Besides students' enhancing their competencies, the community also benefits from the activities of the students and the relationships fostered by the service learning projects. Service learning partners often benefit from the projects of graduate students (Henderson & Brookhart, 1997; Kelly & Miller, 2008). Graduate students also discover the value of their work to those they serve and increase their commitment to their campus and community (McCluskey-Titus, 2008) (similar to undergraduates (Parker et al., 2009)).

Transformational learning that stems from service learning goes beyond mere professional benefits for the student and service learning partner. This involves a change in frame of reference within the student that stems from interactions with the partner (Ciporen, 2010; Stevens et al., 2010). Such change-oriented service learning experiences among doctoral students can contribute to the development of ethical, change-oriented educational leaders (Henderson & Brookhart, 1997). From service learning experiences, a high percentage of doctoral students reported improvements in their understanding of the community's needs, realizations of personal biases and prejudices, a sense of responsibility, and a sense of obligation to serve the community with plans to continue such service (Kelly & Miller, 2008). Some remnants of transformational learning through the service learning projects could have occurred when graduate students' expressed an appreciation for resources and supports in comparison to those underprivileged partners that they served (McCluskey, 2008) and undergraduates' increased social awareness (Conway et al., 2009), yet these instances do not indicate strong transformational learning signified by a change of behavior because of that experience, as Kelly and Miller found. In our study, the improved confidence experienced by two students in applying their academic work is in accordance with other findings (Correa et al., 2010; DeLaGarza et al., 2010) and offers some evidence of the application of a transformative curriculum with the potential to enhance emotional intelligence in women (Taylor et al., 2009).

The summary of results indicating the benefits of social learning also exemplifies how service learning may be applied at the graduate level. To improve service learning projects, structuring reflections has demonstrated value to the overall service learning experience (Conway et al., 2009). Faculty can build a practice reflection activity for students to gain feedback on their journaling and structure the reflection journals by asking specific questions aligned with course objectives (Kelly & Miller, 2008), such as the DEAL model of reflection (Molee et al., 2010). Further building in structures to the service learning course can entail ensuring application of course content and students' service to their community (McLaughlin, 2010). For example, faculty can introduce students to service learning partners' concerns to frame students' experiences and increase their awareness, use course material to reinforce service learning experiences, and offer class discussion time about service learning projects to allow students to share and benefit from others' learning (McCluskey-Tutus, 2008), expanding students' repertoire for reflection (Fiddler & Mareieanau, 2008). These practices proved successful in our experiences. Furthermore, faculty and service learning partners can build relationships with each other to enhance the benefits for both the partner and the student (Kelly & Miller, 2008) by planning faculty-partner communication into the course

to check on students' progress and evaluate the projects. Enhancing service relationships can also involve structuring the course specifically for students' career development (McLaughlin, 2010), including networking with key service learning partners. This was achieved by allowing students to choose their service learning partners, in our case. The opportunity for in-class reflection time and students' autonomy with the projects' progress enhanced the experiences of the women leaders in this study, as it did for students enrolled in a master's of public accounting course completing service learning projects (Lu & Lambright, 2010). Such in class reflection time is recommended in planning service learning courses. Also, students can work together as teams to provide graduate-level, professional mentoring to each other (McCluskey-Titus, 2008). Instructors can provide instruction about working as a team for service learning to increase successful outcomes.

#### Conclusion

Service learning proves invaluable at the doctoral level, as the training doctoral students receive should result in higher level thinking skills. As practitioners or researchers, doctoral students must independently apply, analyze, synthesize, and create knowledge upon completion of their doctoral training. For this reason, service learning provides a platform for gaining these necessary skills with the scaffolding from students' service learning partners (i.e., practitioners in the community) and students' professors. Service learning fosters such higher level thinking and practice among doctoral students.

Given the summary of results for women educational leaders completing service learning projects in a doctoral educational leadership program; of salient professional and academic growth; some evidence of benefits for the service learning partner; as well as transformational learning for students, we recommend further inquiry into the outcomes and implications for improving service learning as a teaching method at the doctoral level. A strength-based study of the benefits of service learning may further the teaching method's influence on students' transformative learning and strengthen relationships with service learning partners. Service learning has the potential to create a win-win situation for students, faculty, campuses, and communities.

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# Effects of the Physical Laboratory versus the Virtual Laboratory in Teaching Simple Electric Circuits on Conceptual Achievement and Attitudes towards the Subject

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### Abstract

Current study examined the effects of virtual and physical laboratory practices on students' conceptual achievement in the subject of electricity and their attitudes towards simple electric circuits. Two groups (virtual and physical) selected through simple random sampling was taught with web-aided material called "Electricity in Our Lives". Quasi experimental research design was used in the study and "Simple Electric Circuits Achievement Test" composed of three dimensions (CCAB, FCC and RCE) and "Attitude Scale for Simple Electric Circuits" composed of five dimensions were given to the groups are pre and posttests. It was identified that conceptual achievement significantly differed in the CCAB and RCE dimensions of the virtual laboratory implementations on the basis of total scores compared to the physical group whereas no meaningful differences were detected in the FCC dimension. It was also found that virtual laboratory implementations did not generate differences in student attitudes towards simple electric circuits.

Key Words: virtual laboratory, elementary science, achievement, electricity subject

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## Introduction

Visual materials are needed in science education for students to better comprehend the subjects since science classes have theoretical natures and include abstract concepts. Computer-aided instruction plays an important role in presenting science subjects to students in a more concretized manner and presents active learning opportunities to teachers and students through computer technologies (Akçay et. al., 2006).

Meta-analysis studies that present a wide perspective regarding the effectiveness of computeraided instruction suggest that these practices are most effective at primary education levels (4-8 grades) (Tekb1y1k & Akdeniz, 2010; Liao, 2007). Similarly, various meta-analysis studies discovered that computer-aided instruction is more effective in teaching physics subjects compared to other science disciplines (Tekb1y1k & Akdeniz, 2010; Bayraktar, 2001-2002; Christmann & Badgett, 1999). All these studies show the inevitable popularity of computer-aided practices and recently, many studies have begun focusing on whether virtual implementations can replace real, physical implementations (Finkelstein et al., 2005; Klahr, Triona, & Williams, 2007; Zacharia, Olympiou, &Papaevipidou, 2008; Olympiou&Zacharia, 2012).

### **Theoretical Framework**

For students, experiments and laboratory work are crucial in correctly making sense of the natural world. Virtual laboratories have started to become alternatives for physical laboratories with the rising popularity of technology use in education. Studies on the effectiveness of physical environment (PE) and virtual environment (VE) implementations suggest that each environment provides distinctive benefits (Carmichael et al., 2010; Finkelstein et al., 2005; Gire et al., 2010; Zacharia, 2007). It is stated that PE implementations in which students can undertake laboratory activities by active touches provide them with opportunities to plan and implement an experiment process. In this process, students go through phases to obtain data and finalize their research by selecting appropriate materials (Gire et al., 2010). PE implementations allow individuals to realize errors in laboratory work as well (Toth, Klahr & Chen, 2000). When one considers that errors direct students toward accurate information, it is apparent that errors in one simulation will have a limited teaching effect. It is also reported that physical laboratories will develop psycho-motor skills and create awareness about laboratory safety procedures (Balamuralithara & Woods, 2009).

On the other hand, VE allows students implementations without the necessity for safety precautions. Experiments in the virtual laboratory can be repeated rapidly and economically (Huppert & Lazarowitz, 2002). It can be thought that virtual environments are not necessary when experiments are carried out physically; however, advantages provided by virtual laboratories in concretizing events that cannot be observed with the naked eye (such as the load flow in a conductor) and making them clearer and understandable should not be overlooked (Windschitl, 2000). One of the crucial purposes of instruction is to ensure conceptual understanding in students. Various studies have presented the effectiveness of PE and VE implementations separately (Zacharia & Anderson, 2003; Zacharia & Constantinou, 2008; Zacharia & Olympiou, 2011) and in blended forms (Olympiou & Zacharia, 2012).

### **Related Literature**

The Primary and secondary school science instruction program in Turkey has been developed in a spiral manner, i.e. subjects are repeated annually and their scopes are expanded in the next year. (Ministry of National Education, 2005; Ministry of National Education; 2013). The subject of electricity is presented

in the third grade of primary school. This practice may negatively affect the next year in cases where there are problems in the necessary skills.

Studies show that students consider the subject of electric circuits as difficult and have trouble comprehending it (Duit & von Rhöneck, 1998; Driver et al. 1994; Engelhardt & Beichner, 2004; Ergin & Atasoy, 2013; Shipstoneet al., 1988;).Various misconceptions or alternative conceptions are common in the subjects of electric current, resistor, potential and direct current in a wide range from primary grades to the university level (Çepni, & Keleş, 2006; Demirezen, 2010; Ergin & Atasoy, 2013; Jabot, & Henry, 2007; Kucukozer, 2004; Lee &Law, 2001; Osborne, 1983; Sencar & Eryılmaz 2004; Tsai, Chen, Chou, & Lain, 2007). Keser and Başak (2013) investigated the level of student acquisition in the "Electricity in Our Lives" unit of the science instruction program. The study, which analyzed qualitative and quantitative data regarding the acquisitions of 200 6<sup>th</sup> graders in the instruction program, showed that the obtained knowledge and skills were not at the desired level and that students displayed misconceptions in subjects such as composing circuits and controlling the brightness of the bulb. Reasons for misconceptions included the abstractness of the subject (Kucukozer, 2004), changes in the academic knowledge by the time it is used in the classroom environment (Tekbıyık & Sağlam Arslan, 2008), and negative student attitudes towards the lesson or the subject (Akgün, 2009).

It is also stated that focusing on the conceptual dimension of the "simple electric circuits" subject and associating it with practices in daily life will increase student interest and help students better comprehend the importance of the subject (Taşlıdere & Eryılmaz, 2012). It is suggested that simple analogies will not be sufficient to provide conceptual development and therefore complex models that allow different practices should be used (Clement & Steinberg, 2002). Therefore, various approaches have been investigated and the question of whether PE or VE will be more effective in teaching simple electric circuits has occupied the researchers' minds.

Zacharia (2007) tried to teach electric circuits by forming two groups. In the process, one of the groups utilized real experimentation (RE) while the other group used real experimentation during the first half of the semester and virtual experimentation (VE) in the second half. Study results showed that the group utilizing virtual experimentation displayed better conceptual development and more rapidly acquired conceptual knowledge compared to the RE group.

In another experimental study, Jaakkola and Nurmi (2008) created three different environments and gave the same assignments to each group about electric circuits. The first group engaged with their tasks in the physical environment (PE) and the second group used the virtual environment (VE), whereas the third group first used the virtual environment followed by the physical environment. Results of the study showed that the most advantageous group was the one that utilized both environments, followed by the virtual group and physical groups, respectively.

Another study that compared physical and virtual implementations is Finkelstein et al's (2005) study, which investigated university students' skills in connecting resistors, forming circuits and measuring resistance and current. The group working in the physical environment used real physical circuit materials that were similar to the manipulatives in the simulations used by the group in the virtual environment. The results revealed that the group working with virtual manipulatives were more successful compared to the group using physical manipulatives. Finkelstein et al's (2005) study showed that well designed simulations are effective in teaching the electric circuits unit.

Various implementations that compared virtual and physical environments in teaching electric circuits can be found in literature. These studies investigated cognitive variables such as conceptual achievement, forming circuits, and measuring current or resistance. However, modern instruction

programs include affective goals such as developing positive attitudes towards a lesson or a subject in addition to cognitive goals (Ministry of National Education, 2005; Ministry of National Education, 2013). It is understood that attitudes in science are related to many factors, particularly achievement (George, 2006; Koballa, 1988; Osborne, Simon & Collins, 2003; Sorge, 2007; Tekbıyık & İpek, 2007). Today, it is reported that attitudes towards subjects that constitute the lesson should be investigated instead of just studying the attitudes towards the lesson (Şengören, Tanel &Kavcar, 2007; Taşlıdere & Eryılmaz, 2012). Therefore, it is crucial to examine the effect of physical or virtual environment implementations on attitudes as well as on cognitive characteristics.

### **Purpose of the Study**

The current study aimed to compare the effects of virtual and physical laboratory implementations regarding the "Simple Electric Circuits" unit on 5<sup>th</sup> graders' conceptual achievement and their attitudes towards the "Simple Electric Circuit" subject.

#### Method

#### **Design and Sample**

The study was implemented with a pretest-posttest quasi-experimental design. One of two groups selected through simple random sampling method in the 2012-2013 academic year in a province of Turkey was assigned as the Virtual group while the other was assigned as the Physical group. The virtual and physical groups included 32 and 33 students respectively. The virtual group was taught with the "Electricity in Our Lives" educational software developed by the researchers. Students in the virtual group used individual computers during implementations. Educational software was downloaded onto personal computers which were equipped with headphones for audio support necessary for the software. The physical group used hands-on materials in their activities. Each group was given an attitude scale about simple electricity and a conceptual achievement test on simple electric circuits as pretest and posttest. Instruction was completed in both groups in five weeks in a total of 30 class hours. Table 1 presents the experimental design of the study.

Table I. Desig	II OI Study			
Groups	Pretest	Treatment	Period	Posttest
Virtual	CAT	Virtual Manipulativa	ulative 5 Weeks	CAT
(N=32)	SECAS	vintual Manipulative	J WEEKS	SECAS
Physical	CAT	Physical Manipulative	5 Woolka	CAT
(N=33)	SECAS	Filysical Mainpulative	J WEEKS	SECAS

Table 1. Design of Study

### **Data Collection Tools**

## Simple Electric Circuits Attitude Scale (SECAS)

The Simple Electric Circuits Attitude Scale (SECAS), developed by Taşlıdere and Eryılmaz (2012), was used in the study to identify student attitudes towards the simple electric circuits subject. The scale is a five point Likert scale composed of 24 items and five sub dimensions (interest, importance, behaviors associated with interest, achievement-motivation, and self-competence). Scale items were evaluated as follows: completely Disagree 1, Disagree 2, Undecided 3, Agree 4 and Completely Agree 5.

Cronbach' Alpha reliability coefficient of the original scale was found to be 0.93 and it was found to be 0.92 in the current study.

## Conceptual Achievement Test (CAT)

Students were expected to develop the required skills for "controlling and changing variables that affect the brightness of the bulb, forming closed circuits, and recognizing circuit elements" at the end of the instruction period of the study. The test developed for the study was envisioned to include these characteristics. A conceptual achievement test of 25 items was developed by the researches with this aim. Test items were examined by two field expert instructors and two science teachers. Five items were removed from the test according to expert views. Experts were asked to group the items in the test according to subject. By consensus, all experts stated that the test was composed of three sections: "controlling and changing variables that affect the brightness of the bulb" (CCAB) (9 items), forming closed circuits (FCC) (6 items) and recognizing circuit elements (RCE) (5 items). According to the item analysis of the test, the mean item difficulty was found to be 0.58 and the mean item discrimination was calculated as 0.42. The KR-20 coefficient regarding the internal consistency of the test was also calculated, and the value of 0.75 was obtained for the 20-item test.

### Characteristics of the Software Used in the Virtual Environment

Educational software on the "Electricity in Our Lives" unit in the Primary Education 5<sup>th</sup> grade Science and Technology class instruction program, which was developed in a web based environment using PHP language, was implemented. The web site prepared for the study was supported by visual content, figures, and simulations developed by Adobe Photoshop, Adobe Flash, and Freehand to ensure suitability for age and level, arousal of interest and active participation.

When the educational software starts, the welcome page comes up. This section includes an informative text with directions on how to use the educational software and a short video. When the user name is entered, the main page appears. This section includes the textbook, lectures, activities, assessment and chat options. The instructional design and content of the educational software consists of level appropriate interactive practices, particularly lectures and activities sections which allow students to learn by doing.

Activities such as matching models and symbols to support recognition of simple electric circuit elements are presented in the materials. One of the activities asks students to match the models of circuit elements with their symbols. Students need to drag the circuit element models to the boxes under the symbols. The system does not allow dragging the wrong symbol to the right box. Therefore, the software directs students to correctly match the symbols with the models. Another activity asks students to form the circuit diagram provided on the left with the circuit elements provided on the top. Students manage to form the accurate circuit diagram after several attempts (see Figure 1).



Figure 1. a. Model-symbol matching activity b. Forming circuits based on the circuit diagram- print screen

In the next steps of the process, students discover the factors that affect the brightness of the bulb by forming closed circuits based on the directions provided on the screen. In this section, students are given unlimited trials and opportunities to use as many circuit elements in the way they choose. The "Activities" tab of the software provides active learning experiences and the "Lectures" tab presents theoretical materials to read. For instance, the definition of electric energy and samples of how we use electric energy in daily life are located in these tabs. Also, the chat environment in the software provides active interaction between the teacher and students, and among students themselves.

## Results

An independent samples t-test was given to students to identify probable differences between the conceptual achievement levels of virtual and physical groups. Results show no significant differences in the CCAB (t(63) = 0.736; p > 0.05), FCC (t(63) = 0.900; p > 0.05) and RCE (t(63) = 1.082; p > 0.05) and total conceptual achievement scores (t(63) = 0.270; p > 0.05) of the Virtual and Physical groups prior to the study (see Table 2)..

		Pretest		Po	sttest	
Group	N	M (SD)	<i>t</i> (63)	M (SD)	<i>t</i> (63)	
Virtual	32	25.9 (7.6)	0.726*	40.0 (3.6)	2 602**	
Physical	33	27.4 (8.7)	0.750	37.1 (5.2)	2.005	
Virtual	32	21.7 (7.2)	0.000*	28.6 (2.6)	0.062*	
Physical	33	20.0 (8.1)	0.900	28.6 (2.9)	0.005	
Virtual	32	21.3 (5.4)	1.082*	24.4 (1.7)	2 276**	
Physical	33	22.4 (3.1)	1.082	22.7 (3.6)	2.370	
Virtual	32	68.91 (14.4)	0.270*	92.9 (4.5)	2 012**	
Physical	33	69.8 (13.7)	0.270	88.5 (7.1)	3.013	
	Group Virtual Physical Virtual Physical Virtual Physical Virtual Physical	GroupNVirtual32Physical33Virtual32Physical33Virtual32Physical33Virtual32Physical33Virtual32Physical33	Group N M (SD)   Virtual 32 25.9 (7.6)   Physical 33 27.4 (8.7)   Virtual 32 21.7 (7.2)   Physical 33 20.0 (8.1)   Virtual 32 21.3 (5.4)   Physical 33 22.4 (3.1)   Virtual 32 68.91 (14.4)   Physical 33 69.8 (13.7)	PretestGroupN $M(SD)$ $t(63)$ Virtual3225.9 (7.6) $0.736^*$ Physical3327.4 (8.7) $0.900^*$ Virtual3221.7 (7.2) $0.900^*$ Physical3320.0 (8.1) $1.082^*$ Virtual3221.3 (5.4) $1.082^*$ Physical3322.4 (3.1) $0.270^*$ Virtual3268.91 (14.4) $0.270^*$	PretestPointGroupN $M(SD)$ $t(63)$ $M(SD)$ Virtual3225.9 (7.6) $0.736^*$ 40.0 (3.6)Physical3327.4 (8.7) $0.736^*$ 37.1 (5.2)Virtual3221.7 (7.2) $0.900^*$ 28.6 (2.6)Physical3320.0 (8.1) $0.900^*$ 28.6 (2.9)Virtual3221.3 (5.4) $1.082^*$ 24.4 (1.7)Physical3322.4 (3.1) $0.270^*$ 92.9 (4.5)Physical3369.8 (13.7)88.5 (7.1)	

Table 2. Comparison of Conceptual Achievement Pretest Scores of the Virtual and Physical Groups

Notes. SD= Standard Deviation \*p>.05. \*\*p<.05

Table 2 shows significant differences between Virtual and Physical groups' posttest conceptual achievement scores in favor of the virtual group in CCAB (t(63) = 2.603; p < 0.05) and RCE (t(63) = 2.376; p < 0.05) dimensions and based on total scores (t(63) = 3.013; p < 0.05). However no significant differences were detected in the FCC dimension (t(63) = 0.063; p > 0.05). This result suggests that virtual implementation is more effective than physical implementation in regards to students' conceptual achievement.

The graphic displayed in Figure 2 was generated to better display the changes in the groups' mean conceptual achievement scores before and after the implementation. The graphic shows that the achievement level is similar in all sub dimensions of the conceptual test. Examination of the posttests suggests increases of conceptual levels in all dimensions. In other words, both virtual and physical implementations increased students' conceptual achievement. However, the virtual group had better results in developing CCAB and RCE skills compared to the other group.



Figure 2. Comparison of group means for pretest and posttest conceptual achievement

Students' attitude scores for Simple Electric Circuits were examined based on dimensions and the findings are provided in Table 3. Results present no significant differences in Virtual and Physical groups' pretest and posttest scores.

			Pr	retest	Posttest		
Dimension	Group	Ν	M(SD)	<i>t</i> (63)	M (SD)	<i>t</i> (63)	
	Virtual	32	4.4 (0.6)	1 215*	4.4 (0.8)	0.097*	
Interest	Physical	33	4.6 (0.5)	1.315	4.4(0.8)		
Turneration	Virtual	32	4.3 (0.7)	0.000*	4.3 (0.6)	0.762*	
Importance	Physical	33	4.5 (0.5)	0.990	4.4 (0.9)	0.702	
Behaviors Associated	Virtual	32	4.2 (1.0)	$1.102^{*}$	4.4 (0.7)	1.047*	
with Interest	Physical	33	4.5 (0.6)	1.185	4.1 (1.1)	1.347	
Achievement-	Virtual	32	4.6 (0.5)	0.200*	4.5 (0.6)	0.002*	
Motivation	Physical	33	4.6 (0.4)	0.269	4.5 (0.9)	0.093	
0.10.0	Virtual	32	4.0 (0.9)	1.010*	3.9 (0.9)	0 5 4 4*	
Self-Competence	Physical	33	4.4 (0.7)	1.810	3.9 (0.9)	0.544	

Table 3. Comparison of SECAS Pretest Scores of the Virtual and Physical Groups

Note. \*p>.05

#### Discussion

The current study aimed to contribute to the literature by examining whether VE or PE was more effective in teaching "simple electric circuits" subject to 5<sup>th</sup> grade students studying the "Electricity in Our Lives" unit. In the process, a web-based virtual environment was created to allow active student participation. Similar activities were undertaken in the physical environment with real materials. After the implementation, it was identified that RCE and CCAB skills developed more in the virtual group whereas similar levels of development were observed in both groups in terms of FCC skills. The implemented software included a model-symbol matching activity to develop the recognition of circuit elements (RCE) skill. Students can undertake unlimited trials to match the images of circuit elements with their symbols. Circuit elements such as batteries, bulbs, conducting wires, and switches are presented with rich visual contents. Students in the physical environment attempted to learn about the circuit elements by touching and seeing them in real time. The difference found in the skills development may be related to the fact that the virtual environment provides rapid feedback and allows repetition of the activity (Huppert & Lazarowitz, 2002; Ronen & Eliahu, 2000). Repitition is one of the most important self-regulatory activities that allows individuals to direct their own learning (Pintrich et al.,1991, Pintrich, 1993).

The virtual group was also more effective in developing the skills for "controlling and changing variables that affect the brightness of the bulb" (CCAB). It is possible to change the number of bulbs and their wiring styles, series battery numbers, or the resistance of the conductors that forms the circuit in order to change the brightness of the bulb in the electric circuit. Students in the physical group had to form the circuit again each time for a new trial. However, students in the virtual group had the chance to carry the circuit elements anywhere on their screens just by moving their computer cursor. 5<sup>th</sup> grade is the level in which students' have acquired psycho-motor developments and the manual dexterity necessary to make rapid changes in electric circuits. In that respect, the opportunity to change the variables and monitor the changes instantly in the virtual group may have caused the superiority observed in this group. This finding also supports the information in the literature that computer-aided instruction is most effective at primary education levels (Tekbiyik & Akdeniz, 2010; Liao, 2007). Implementations regarding the FCC skills caused similar developments in both groups. A physical environment allows instant feedback to students during the formation of circuits. Existence of the current can be instantly determined in the closed circuit by using bulbs. The physical environment is more advantageous than the virtual environment based on this characteristic. On the other hand, the fact that the virtual environment can form the circuit rapidly and provides instant feedback (Huppert & Lazarowitz, 2002; Ronen & Eliahu, 2000) may have caused similar conceptual development levels in both groups. It is possible to find cases in which physical and virtual environments cause similar conceptual developments (Farrokhnia & Esmaeilpour, 2010; Zacharia & Olympiou, 2011).

It was observed in the study that implementations in both the physical and virtual groups were effective in providing conceptual development (Figure 5). It was also suggested that traditional methods did not provide conceptual growth at the desired level in the "Electricity in Our Lives" unit and were not effective in removing misconceptions (Keser & Başak, 2013). Therefore, it may be implied that implementations used in the current study are superior to traditional methods even though no groups in the current study were taught by traditional methods.

Compared to the use of only one environment, the literature also mentions cases of more effective learning environments in which virtual and physical implementations are blended (Farrokhnia & Esmaeilpour, 2010; Lee, Guo & Ho, 2008; Olympiou & Zacharia, 2012; Zacharia, 2007; Zacharia & Olympiou, 2011). These studies pointed to the fact that blending virtual and physical environments is more effective for conceptual development since it combines the beneficial and superior aspects of both.

The current study found that virtual and physical implementations did not have an effect on student attitudes towards simple electric circuits. Changing individual attitudes towards one subject in a short period of time is a difficult affective process (Tavşancıl, 2005). It may be suggested that the 5-week implementation period of the study may have been insufficient to develop related attitudes.

## **Conclusions and Implications**

Compared to physical environment activities, virtual environment software developed for the study to teach Simple Electric Circuits was found to provide higher levels of conceptual development in students in *recognizing circuit elements* and in *identifying variables that affect the brightness of the bulb*. Both environments provided similar levels of development for the skill of *forming circuits*. These results were caused by the different opportunities provided by each environment. In this regard, using virtual and physical environment activities in a blended manner will provide the use of natural realities of the physical environment along with the rapid feedback options and repetition opportunities of the virtual environment. Also, investigation of the effects of these implementations on removing possible student misconceptions regarding simple electric circuits is crucial for future studies, although this angle was not included in the current study.

The study showed that both physical and virtual environments did not have an effect on student attitudes towards the subject. This may be related to the fact that attitudes towards a subject are hard to change in short periods of time. It is also known that ensuring reliability in measuring attitudes is more difficult compared to ensuring reliability for the measurement of cognitive skills (Mehrens & Lehmann, 1987). Especially in identifying the attitudes of primary grade students, the triple sided structure of attitude which is composed of feelings, thoughts and actions should be measured by a process based on observation and interviews, instead of pen and paper tests, in order to have more valid results. In fact, it is indicated that different results may be obtained when an individual's attitude towards specific communities, objects, institutions, or events is determined through different techniques, and the most valid method to determine an individual's behavior (what he does, tells, writes etc.) is the direct observation of the behaviors of the person in question

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# Analysis of the Relationship between Estimation Skills Based on Calculation and Number Sense of Prospective Classroom Teachers\*

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### Abstract

The aim of this study are to examine the relationship between prospective classroom teachers' estimation skills based on calculation and their number sense and to investigate whether their number sense and estimation skills change according to their class level and gender. The participants of the study are 125 prospective classroom teachers studying at faculty of education, department of classroom teaching, in a state university in Turkey. The findings of the study revealed that prospective teachers have a low level of scores in terms of number sense and estimation skills, the scores do not change according to gender but there is a statistically significant difference in terms of their grade levels in number sense test. Additionally, it wasn't indicated that there is a statistically significant differences.

Keywords: number sense, estimation skills, classroom teachers

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### Introduction

The studies on the educational system in Turkey aim to teach the means to access information that changes and shows progress over time rather than directly teaching the information to the students. In order to achieve these aims, the focus has been on building relationships across disciplines, making analogies from the daily life (Çilingir & Türnüklü, 2009). In this respect, there have been changes in the ways to teach and make sense of mathematics. As a result of this change, for instance, the importance of making calculation by means of paper-pencil has been decreasing while the abilities such as making estimation and problem solving have been becoming more important (Çilingir & Türnüklü, 2009). Furthermore, a clear indication of this situation is the aim which is to improve estimation about the results of the calculations in introducing the basic skills through reasoning that is included in the mathematics curriculum (MEB, 2013).

Analyzing the concept of estimation, it can be observed that there have been various definitions in the literature. NCTM (1989) defines the verb to estimate as reaching an approximate conclusion about and calculating approximately the quantities such as a value, an amount, a width, and a weight etc. It was indicated that the word of estimation is used both to refer to the process of estimation and to represent the result of the estimation. On the other hand, there are also certain definitions such as "process of being able to provide an adequate answer to a problem (Reys, 1986)", "quickly having an idea about the quantity or size of something without actually counting or measuring it (Micklo, 1999)." Segovia, Castro, Rico and Castro (1989) define estimation as the decision reached by the results obtained from numerical operations and the evaluation of a quantity or an amount. The general characteristics of the concept of estimation put forward by Reys (1984) and developed by Segovia et al (1989) are as follows: a) determining the value of an arithmetic operation and of a quantity; b) a subject used in identifying certain information, references or experiences; c) being able to evaluate mentally in general; d) being able to do quickly by using numbers as simple as possible; e) the obtained conclusion is not the precise result of the operation, but it is as close as possible to the desired result; f) the obtained value might vary depending on the evaluation criteria of the person.

The simplest concept of mathematics is related to its accuracy. Thus, estimation seems to be quite wrong for mathematics and it is outside the mathematics. However, analyzing the reasons in using estimation, a reversed result has been also revealed. The use of estimation is suitable for the purpose of mathematics, that is, it makes thinking and the course understandable and facilitates the process to cope with the problems and conducts consistent implementations (Usiskin, 1986, p.2). Most of the educators indicate that students have limited information and content related to estimation skills, thus, they should get help from teachers to develop these skills (Leutzinger, Rathmell &Urbatsch, 1986, as cited in Tekinkir, 2008). Analyzing the types of estimation, mathematics educators have investigated estimation by taking measurement estimation and operational estimation to the foreground. Tekinkır (2008) indicates that estimating the weight of a vehicle and the duration for walking a kilometer away by an adult could be given as an example for measurement estimation. Segovia and Castro (2009) indicate that there are two types of magnitude in measurement estimation and they derive from continuous and intermittent measurement. While estimating the height of a person could be given as an example for continuous magnitude measurement estimation, estimating the number of people in a meeting could be given as an example for intermittent measurement as well. In terms of measurement estimation Dowker (1992) indicates that it means to be able to make a reasonable estimation without calculation to find an answer to a problem. Segovia and Castro (2009) refer to measurement estimation as finding arithmetic operations and the results of them. For example, estimating approximately that 52 times 2345 is 120.000 could be given as an example for it.

The estimation based on calculation refers to reasoning to predict in order to obtain approximate answers about arithmetic problems (Liu & Neber, 2012). Sowder and Wheeler (1989) reflect that the estimation based on calculation includes conceptual components, skills components, related concepts and skills, and affective components. Furthermore, estimation skills have developmental characteristics. Some researchers express that the estimation skills enhance with advancing age and older people have tried more ways of estimation compared to other people (LeFevre, Greenham, & Waheed, 1993, Sowder & Wheeler, 1989).

In the studies on estimation skills, it was investigated whether gender factor is also an important variable. Mottram (1995) and Boz (2004) have concluded that estimation skills do not change according to gender. In the study on estimation skills, Munakata (2002) concluded that boys answered more questions than girls, thus, their scores in estimation skills test are higher.

Another concept in mathematics education is the concept of number sense. Number sense refers to the ability of people to have a good knowledge and understanding of numbers and operations as well as their relations, and to deal with daily life situations involving numbers; and this ability is used in developing flexible and convenient strategies in dealing with numerical problems (Howden, 1989; McIntosh, Reys & Reys, 1992; Yang, 2003). Howden (1989) defines the concept of number sense as a true sense regarding numbers and the relations between each other. Number sense includes a flexible way and useful strategies dealing with numbers and operations and capabilities and tendencies (Reys & Yang, 1998).

In recent years, the concept of number sense has been a topic of focus among mathematics educators, educational psychologists and researchers. Analyzing the studies, it was seen that there were principle components and frameworks on number sense (McIntosh, B. Reys, & R. Reys, 1992; Markovits & Sowder, 1994). Yang (2007) identified four components and this study was conducted based on these four components. The first of these components is Understanding the Meaning of Numbers, Operations and Their Relationships and it includes the understanding of integers, fractions, decimal system based on decimal numbers, four operations and multiple ways of representing (McIntosh, et al., 1992, as cited in Yang, 2010). The representation of the numbers more than one (%  $25 = \frac{1}{4} = .25$ ) could be given as an example for this. The second component is Recognizing Relative Number Size. The expectancy in this component is to be able to realize relatively the magnitude of the numbers. This component does not adhere to written procedures, for example, different ways are used to be able to find the smallest common denominator (Cramer, Post, & delMas, 2002). The third component is Developing and Using Benchmarks Appropriately. As an example, when students were asked the operation such as 19/31x7/15, the student knows that the multiplier is less than 1 and the second multiplier is less than 1/2, thus, he/she determines the result is less than 1/2 and 1/2 is a reference point for him. The last component is Judging the Reasonableness of a Computational Result by Using the Strategies of Estimation. In this component, the students are asked a question like  $0.525 \times 987.6 = 51849$  and they are asked to guess where to use comma and doing so, he/she is not prompted to take advantage of any written algorithm. The importance of addressing the issue of number sense in school mathematics is emphasized in many national reports (National Research Council, 1989; Japanese Ministry of Education, 1989; Australian Education Council, 1991). However, it was revealed that many pupils in primary education are inadequate in skills of number sense (Reys & Yang, 1998; Markovits & Sowder, 1994) and the reason for this is indicated that rules are emphasized seriously rather than number sense in the calculations included in the books (Yang, Reys & Reys, 2009).

The curriculum and assessment standards for school mathematics emphasize that teaching number sense is one of the fundamental objectives of school mathematics curriculum. Teachers have a critical role in teaching number sense and enable students to learn number sense and to appreciate its

## International Journal of Progressive Education, Volume 11 Number 3, 2015 $\ensuremath{\mathbb{C}}$ 2015 INASED

importance (Yang, 2007). One of the reasons that students fail in developing and using number sense is the lack of knowledge of teachers about how to help students in developing number sense as well as the insufficient knowledge of teachers with regard to the concept of number sense (Yang, Reys & Reys, 2009). Given the importance of the role of teachers in the improvement of number sense, it is an issue of concern what the competence level of teachers in regard to number sense is. Since the level of teachers in regard to this issue would affect the education number sense that they provide to students (Yang, 2007). Furthermore, there have been few studies on number sense of prospective classroom teachers in the literature.

The aim of this study is to explore the performances of prospective classroom teachers in estimation skills and number sense tests and to identify whether there is a relationship between the scores that they obtain from these tests. Within this purpose, answers to the following sub-problems have been sought.

- 1) What are prospective classroom teachers' performances in estimation skills and number sense tests?
- 2) Is there a significant difference between prospective classroom teachers' scores obtained from estimation skills and numbers sense tests and the scores obtained from sub-dimensions of these tests according to grade levels?
- 3) Is there a significant difference between prospective classroom teachers' scores in estimation skills and number sense tests according to gender?
- 4) Is there a significant difference between prospective classroom teachers' total scores in estimation skills and number sense tests?
- 5) Is there a significant difference between prospective classroom teachers' scores in the components of estimation skills and number sense tests?

### Method

Relational survey model was used in this study that aimed to describe prospective teachers' performances in estimation skills and number sense tests. Survey models are approaches that aim to describe an existing situation in the past or present in a way that they are (Karasar, 2000).

## **Participants**

A total of 125 prospective teachers (Table 1) studying in the department of classroom teaching for elementary schools in a public university (33 first, 31 second, 29 third and 31 fourth grade prospective classroom teachers) have participated in this study, which was carried out at the end of the fall semester of 2014-2015. The participants have been selected by means of purposive sampling method which is one of non-random sampling methods. The reason that the sample of the study is selected from the department of classroom teaching is that the basics of mathematics course are taught in elementary school.

	Grade Level								
Condon		1st Grade	2nd Grade	3rd Grade	4th Grade	Total			
Gender	Female	29	25	19	21	94			
	Male	4	6	10	11	31			
Total		33	31	29	32	125			

## Table 1.

The distribution of participants by variables of gender and grade levels

### **Data Collection Tools**

As data collection tools, "Number Sense Test" and "Estimation Skill Test Based on Calculation" have been utilized in this study to demonstrate the levels of number sense and estimation skills of prospective classroom teachers. The Number Sense Test consisted of 12 questions by taking advantage of the test developed by Yang (2007).

Several necessary changes have been conducted by having experts' views and Kr20 internal consistency coefficient of this test has been found to be .79. The prospective teachers solving a question in the number sense correctly have been given 1 point whereas those answering wrongly or not answering at all have been given 0 point. The maximum score that can be obtained from the number sense test is 12 while the minimum score is 0.

4 components are included in this test. These are Understanding the Meaning of Numbers (UMN), Operations and Their Relationships (OTR), Recognizing Relative Number Size (RRNS), and Developing and Using Benchmarks Appropriately and Judging the Reasonableness of a Computational Result By Using the Strategies of Estimation (DUBA).

Estimation skills test was developed by Tekinkır (2008) and consisted of 32 questions. The reliability finding of this test shows that Kr20 internal consistency coefficient is .84. The prospective teachers providing a correct answer in estimation skills test have been given 1 point whereas those answering wrongly or not answering at all have been given 0 point. The maximum score that can be obtained from the estimation skills test is 32 while the minimum score is 0. With respect to the kinds of issues and estimates of the items in the test, there are 20 items in operational estimation skills (OE) and 12 items in measurement estimation (ME).

### **Data Analysis**

In data analysis, the performances of the participants in number sense and estimation skills tests in terms of grade levels have been initially determined and the average scores and standard deviation of these performances have been calculated. Parametric tests have been conducted in the statistics to be performed since a normal distribution of the data has been found in data analysis. In order to determine whether there is a difference between the performances of the participants in the number sense and estimation skills tests in terms of grade level, "One Way Anova" has been carried out. After determining the existence of a difference, one of the post-hoc tests depending on the homogeneity state of variances has been utilized in order to determine the grade levels in which there is a difference. Additionally, t-tests

were conducted in order to analyze whether there is a significant difference between participants' scores in number sense test and estimation skills tests.

### Findings

In this part, the findings obtained by means of the analysis of data through estimation skills test and number sense test of prospective classroom teachers have been demonstrated in details.

Table 2:

Findings regarding descriptive statistics of components of number sense test according to grade levels

						Grade	e Levels				
		Gra	de 1	Grade 2		Grade 3		Grade 4		Toplam	
		Х	SS	Х	SS	Х	SS	Х	SS	Х	SS
	UMN	,848	,712	1,387	,803	,724	,701	1,062	,837	1,0080	,83758
onents	OTR	,666	,645	,806	,601	,758	,689	,406	,636	,6560	,63632
Comp	RRNS	1,030	,683	1,163	,860	,758	,689	1,093	,772	1,0160	,77234
Ŭ	DUBA	,454	,616	,516	,625	,379	,621	,625	,655	,4960	,65530
	Total	3,00	1,479	3,87	1,586	2,62	1,498	3,19	1,656	3,18	1,656

Analyzing the Table 2, with regard to number sense test, it was revealed that while the component in which 1st and 4th grade prospective classroom teachers are the most successful is RRNS (Recognizing Relative Number Size), for 3<sup>rd</sup> grade students it is Operations and Their Relationships (OTR) and RNNS, and for 2<sup>nd</sup> grade students it is UMN, in other words, Understanding the Meaning of Numbers. In general, while the component in number sense test in which prospective teachers are the most successful is RNNS ( $\bar{x} = 1,016$ ), the one in which they are the least successful is DUBA ( $\bar{x} = 0,4960$ ). In all questions, the mean score of 1st grade prospective classroom teachers is 3.00, the mean score of 2nd grade level is 3.87, the mean score of 3rd grade level is 2.62 and lastly, the mean score of 4th grade level is 3.19. It was revealed that the highest mean score belongs to 2nd grade prospective classroom teachers ( $\bar{x} = 3,87$ ), and

the lowest mean score belongs to 3rd grade classroom teachers (x=2,62). The participants' scores in number sense test is 3.18 and the value indicates that prospective teachers have a quite low level of number sense skills. One-way ANOVA was used in this study in order to analyze whether there is a significant difference between participants' scores in number sense test and their grade levels. The results are indicated in the Table 3 as in the following:

Table 3:

One way Anova results demonstrating the variance in the scores of number sense test in terms of grade level

Group	Source	Sum of	sd	Mean	F	р
		Squares		Square		
UMN	Between	7,727	3	2,576	3,932	,010
	Groups					
	Within	79,265	121	,655		
	Groups					
	Total	86,992	124			
OTR	Between	3,007	3	1,002	2,569	,057
	Groups					
	Within	47,201	121	,390		
	Groups					
	Total	50,208	124			
RRNS	Between	2,776	3	,925	1,573	,200
	Groups					
	Within	71,192	121	,588		
	Groups					
	Total	73,968	124			
DUBA	Between	,997	3	,332	,769	,513
	Groups					
	Within	52,251	121	,432		
	Groups					
	Total	53,248	124			
Total	Between	24,942	3	8,314	3,192	,026
	Groups					
	Within	315,186	121	2,605		
	Groups					
	Total	340,128	124			
	Groups Within Groups Total	315,186 340,128	121	2,605		

## International Journal of Progressive Education, Volume 11 Number 3, 2015 $\ensuremath{\mathbb{C}}$ 2015 INASED

In the Table 3, the differences between components of number sense test and the scores obtained from the whole and grade levels were analyzed. Analyzing the results, it was revealed that there was a significant difference between grade levels ( $F_{(3-121)}$ = 3,932, p< ,05) and the total score in the test ( $F_{(3-121)}$ = 3,192, p< ,05). In the other components of number sense, it was indicated that there was a significant difference in terms of grade levels (p> ,05). Tukey test was conducted in order to analyze in what grades there is a significant difference (the variances are homogenous).

Table 4:

Tukey test results regarding the difference in grade levels in number sense test

	Grade Levels(I)	Grade Levels (J)	Mean (I-J)	Standard Deviation	р
Total	2	3	1,25028	,41695	,015
UMN	1	2	-,53861	,20244	,043

According to the results indicated in Table 4, there has been a significant difference in terms of the scores of number sense test in favor of 2nd grade between 2nd and 3rd grades whereas in UMN component there has been a significant difference in terms of the scores in favor of  $2^{nd}$  grade between  $2^{nd}$  and  $3^{rd}$  grades.

With regard to the scores in number sense test in terms of gender, the analysis results regarding whether there is a significant difference was indicated in Table 5.

## Table 5:

T-test results regarding the difference between scores in number sense test and gender

Gender	Ν	Mean	sd	Sd	t	р
male	31	3,6452	1,51764	100	1.026	0.60
female	94	3,0213	1,67832	123	1,836	,069

Analyzing Table 5, it was revealed that there is not a statistically significant difference between the scores in number sense test and gender ( $t_{(123)}$ = 1,836, p>,05).

## Table 6:

Descriptive Statistics regarding estimation skills test

						Grade L	evels				
		Gra	de 1	Grade 2		Grade 3		Grade 4		Total	
		Х	Ss	Х	Ss	Х	Ss	Х	Ss	Х	Ss
ipon its	OE	11,78	2,88	12,90	2,56	13,89	2,58	12,28	3,62	12,68	3,02
Concen	ME	7,24	1,601	6,258	1,731	6,724	2,51	6,90	2,51	6,79	2,13
	Total	19,03	3,74	19,16	3,56	20,62	4,58	19,18	5,64	19,47	4,45

Descriptive statistics regarding grade levels and types of estimations in estimation skills test were indicated in Table 6. The most successful ones in operational estimations are 3rd grade prospective classroom teachers ( $\bar{x} = 13,89$ ), and the most unsuccessful ones are 1st grade prospective classroom teachers ( $\bar{x} = 11,78$ ). It is seen that there is an increase in terms of operational estimation scores from 1st grade levels to 3rd grade whereas there is a decrease in 4rd grade levels. It was indicated that in measurement estimation questions the most successful ones are 1st prospective classroom teachers ( $\bar{x} = 7,24$ ), whereas the most unsuccessful ones are 2nd grade prospective classroom teachers ( $\bar{x} = 6,25$ ). It was found that the mean scores of all prospective teachers in operational estimation questions is 12,68 and the mean scores in measurement estimation questions is 6,79. In all estimation questions, the lowest mean scores of estimation skills test belong to 1<sup>st</sup> grade prospective classroom teachers by 19,03, whereas the highest mean scores belong to 3<sup>rd</sup> grade prospective classroom teachers by 20,62. In all questions, prospective teachers got 19,47 out of 32. Although it was revealed that there were differences between the mean scores of prospective teachers in terms of estimation skills test and grade levels, One-way Anova was conducted in order to investigate whether the differences were significant. Analysis results on this test were indicated in Table 7.

Table 7:

Anova results regarding the variance in scores of estimation skills test according to grade level

Group	Source	Sum of	sd	Mean	F	р
		Squares		Square		
	Between Groups	75,817	3	25,272	2,892	,038
OE	Within Groups	1057,383	121	8,739		
	Total	1133,200	124			
	Between Groups	16,084	3	5,361	1,187	,318
ME	Within Groups	546,508	121	4,517		
	Total	562,592	124			
Total	Between Groups	50,286	3	16,762	,843	,473
i otur	Within Groups	2406,866	121	19,891		
	Total	2457,152	124			

The differences between the scores in estimation skills test and the sub-dimensions of it in terms of measurement and operational estimations were analyzed in Table 7. It was indicated that there was no

## International Journal of Progressive Education, Volume 11 Number 3, 2015 $\ensuremath{\mathbb{C}}$ 2015 INASED

11.00

statistically significant difference in scores obtained from the whole test  $(F_{(3-121)}=,843, p>,05)$  and in measurement estimation  $(F_{(3-121)}=1,187, p>,05)$  in terms of grade levels. With regard to operational estimation skill, there was a significant difference  $(F_{(3-121)}=2,892, p<,05)$  and to be able to examine in which groups there were significant differences, Tukey test was administered.

Table 8:

Tukey test results rega	ukey test results regarding the difference between groups in estimation skill test									
	Grade Levels(I)	Grade Levels (J)	Mean (I-J)	Standard Deviation	р					
OE	1	3	-2,10867	,75243	,030					

According to the results on Tukey test, there was a significant difference between 1st and 3rd grade levels in favor of 3rd grade levels. Independent samples t-test was conducted in order to analyze whether there was a significant difference between scores of prospective teachers in estimation skill test and gender. The results were indicated in Table 9.

## Table 9:

T-test results regarding the variance between the scores in estimation skill test and gender

Gender	Ν	Mean	sd	Sd	t	р
male	31	20,0968	5,56989	123	40,860	,448
female	94	19,2660	4,02993			·

In Table 9, it was indicated that there was no statistically significant difference in terms of scores in estimation skill test and gender ( $t_{(123)}$ = 40,86, p>,05). Simple Linear Correlation Analysis was conducted in order to analyze whether there was a significant difference between the scores of prospective teachers in estimation skill test and number sense test. Additionally, simple linear correlation analysis was also conducted in order to investigate whether there was a relationship between the components of tests.

### Table 10:

The Correlational Relationship between the Scores in Estimation Skills and Number Sense Test

Test Types	Number Sense Total Score	Estimation Skill Total Score		
Number Sense Total Score	1			
Estimation Skill Total Score	,102	1		

## *p>0,05*

In Table 10, it was indicated that there was no significant relationship between the scores of prospective teachers in estimation skills test and number sense test (r=,102, p>,05).

Table 11:

The correlational relationship between the scores in sub-dimensions of estimation skills test and components of number sense test

Test Components	ÖT	İT	UMN	OTR	RRNS	DUBA
ME	1					
OE	,477**	1				
UMN	-,126	-,190*	1			
OTR	,155	,110	-,070	1		
RRNS	,188*	,151	,062	,307**	1	
DUBA	,080,	,178*	0,96	,026	,175	1

\*\* Significant at p<0,01.

\*Significant at p<0,05.

In Table 11, simple linear correlation analysis was conducted in order to investigate whether there was a relationship between the components of estimation skills and numbers sense test. It was indicated that there was a positive medium correlation (r=,477, p<,01) between measurement estimation and operational estimation, a positive low correlation (r=,188, p<,05) between measurement estimation and UMN, a negative low correlation (r= -,190, p<,05) between operational estimation and UMN, a positive low correlation (r= -,190, p<,05) between operational estimation and UMN, a positive low correlation (r= -,190, p<,05) between operational estimation and UMN, a positive medium (r= ,307, p<,01) relationship between the components of number sense test as OTR and RRNS.

#### **Conclusion and Discussion**

The concept of number sense that has been included in the field of mathematics education in the last thirty years also has an important place today, and it is a part of many mathematics education programs (Şengül & Gülbağcı Dede, 2014). Teachers remain at the forefront of introducing this concept to students; therefore, the determination of the level of pedagogical content knowledge of teachers in regard to number sense has importance (Şengül & Gülbağcı Dede, 2014).

In the mathematics program issued by MEB (2013), it can be observed that the improvement of estimation skill was attached great importance, and educational resources also have been emphasizing the activities of this skill recently. The pedagogical content knowledge of teachers in regard to this issue plays a significant role in the improvement of estimation skills of students.

Given the importance of number sense and estimation skills, this study has determined to what extend the prospective teachers have the knowledge of the subject area that they are required to have in order to enable students to adopt these skills. The scores of the number sense test of prospective classroom teachers have been found to be quite low. This result is not thought to be desired. Since one of the reasons that the number sense of students is low results from the incompetence of teachers in this issue (Yang, Reys & Reys, 2009). The findings obtained also support this statement. The results of some

studies are consistent with the result that the number sense of prospective teachers is low (Yang, 2007, Yang, Reys & Reys, 2009, Kayhan Altay & Umay, 2011; Şengül, 2013).

Analyzing the mean scores in terms of the components of number sense test, it was indicated that prospective classroom teachers had most difficulty in the component as Judging the Reasonableness of a Computational Result by Using the Strategies of Estimation whereas had the most success in the questions included in the component as Developing and Using Benchmarks Appropriately, Additionally, there was a significant difference between understanding the meaning of numbers, operations and their relationships and grade levels through which it was indicated that the scores of 2<sup>nd</sup> grade levels were higher than 1<sup>st</sup> grade levels. In the study, Yang (1995) found out that 8<sup>th</sup> grade level students had a higher level of number sense than 6<sup>th</sup> grade level students, Aunio et. al (2006) concluded that the number sense increased systematically depending on age. Through the study that was applied to secondary school students, Sengül and Gülbağcı (2012) revealed that the more grade levels increased, the more their number sense increased as well. Thus, it could be indicated that the results of these studies are also in line with the findings obtained in this study. Additionally, there has been a significant difference between the scores of number sense test and grade levels. The score of second grade has been found to be significantly higher than that of third grade. The reason behind the finding that indicates the scores of  $2^{nd}$  grade level prospective classroom teachers are higher could result from the idea that prospective teachers have Basic Mathematic 1 and Basic Mathematic 2 courses in 2<sup>nd</sup> grade and it could positively affect the development of their number sense.

With regard to gender, it was indicated that there was no significant difference in terms of number sense scores. However, the mean scores of male prospective teachers were higher than those of female prospective teachers.

In the analysis of the findings of estimation skill test, it has been observed that the prospective teachers have a lower average score. Similarly, in his study, Munakata (2002) concluded that the estimation skills of 5th, 7th, 9th, 11th grade students are low in general. Analyzing the scores of estimation skills test in terms of operational estimation which is the sub component of estimation skills test and grade levels, it was indicated that there was an increase up to 3<sup>rd</sup> grade level, however, there was a decrease in scores of 4rd grade prospective teachers. The reason for the decrease in the scores of 4<sup>th</sup> grade prospective teachers could be addressed to idea that they study for Kamu Personeli Secme Sınavı (The Selection Examination for Professional Posts in Public Organizations), thus, they have a low level of motivation while solving the test. Additionally, in the component of operational estimation there was a significant difference in terms of grade levels which was in favor of 3rd grade levels. Similarly, Lefevre (1993) and Sowder (1984) found that the estimation skills of elementary school students improve depending on age. In results with regard to measurement estimation skills, it was revealed that there was no significant difference in terms of grade levels. However, 1<sup>st</sup> grade level prospective teachers had higher mean scores than the others. In this study, it was concluded that there was no statistically significant difference between scores of prospective teachers in estimation skills test and grade levels. However, analyzing the mean scores, like operational estimation, there was an increase in the mean scores up to  $3^{rd}$  grade but there was a decrease in  $4^{th}$  grade level.

Through the results, it was revealed that there was no significant difference between prospective classroom teachers' estimation skills and their gender types, however, male participants had higher level of mean scores when compared to female participants. There have been various results in the literature. In their studies, Forrester and Beatrice (1995), Reys and Yang (1998), Mottram (1995) and Boz (2004) concluded that gender did not have significant impact on estimation skills; however, Dowker, Flood, Griffiths, Harris and Hook (1996), Munakata (2002) and Reys, Reys, and Penafiel (1991) have revealed

that there were statistically significant differences between female and male participants in terms of estimation skills.

It was found that there was a positive relationship between the scores of prospective teachers in measurement estimation questions and operational estimation questions. Through this result, it was concluded that the more prospective teachers' scores of operational estimation increased, the more their scores of measurement estimation or the more prospective teachers' scores of measurement estimation increased, the more their scores of operational estimation increased as well. In her master thesis that aimed to analyze secondary school students' estimation skills, Tekinkır (2008) found that there was a positive significant relationship between students' measurement and operational estimation scores, thus, it is in line with our findings.

Lastly, it has been concluded that there has not been a significant relationship between the scores of the estimation skill test and the scores of the number sense test of prospective classroom teachers. However, there was a significant relationship between measurement estimation and Developing and Using Benchmarks Appropriately which is one of the components of number sense and there was a significant positive relationship between operational estimation and Judging the Reasonableness of a Computational Result By Using the Strategies of Estimation which is one of the components of number sense test as well. Greeno (1991) expressed that numbers sense has qualifications in that it provides flexibility in mental calculations, is effective in numerical predictions, and provides quantitative judgments and Howden (1989) defines number sense as having a good sense in terms of numbers and relationships between numbers. Through it, we can infer that the concepts as number sense and estimation are actually found in each other, and require each other reciprocally. Thus, the statements by Greeno (1991) and Howden (1989) are in line with our findings.

Prospective classroom teachers have been found to have quite low scores both in number sense test and in estimation skills test; therefore, their area knowledge on these subjects have been concluded to be insufficient. Many of the prospective teachers were in tendency of doing written calculations and finding the exact result and this showed that they had a lack of using estimation while solving the problems. Prospective classroom teachers' being aware of the importance of number sense and estimation skills for mathematical development is of importance for the basis of mathematics education. In this sense, prospective teachers could be provided to be more competent in these matters by reorganizing learning and teaching of number sense and estimation in teacher education programs. Since if prospective teachers learn these matters well, they will know how to teach them to their students and help their students improve their number sense and estimation skills. Additionally, taking the use of technology in mathematics education into consideration, it is thought that both in number sense and estimation skills, technology has an important role in order to obtain reasonable and consistent answers.

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## Science and Technology Teachers' Views About the Causes of Laboratory Accidents

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### Abstract

Aim of this study was to determine science and technology teachers' views about the causes of the problems encountered in laboratories. In this research, phenomenology, a qualitative research design, was used. 21 science and technology teachers who were working in elementary schools in Eskisehir during the 2010–2011 spring semester were the participants of this study. A semi-structured interview form was prepared to collect data. The interview form included three sections. Content analysis was used to deeply analyze and understand the written answers which were obtained from open ended questions. Approxiamately half of teachers expressed that, lack of caution and lack of necessary safety precautions were the causes of laboratory accidents. Moreover, they also expressed that, insufficient science content knowledge and lack of knowledge were influential in the problems encountered. It is thought that, the findings of this study will contribute to determining the causes of problems encountered in laboratories.

Keywords: Causes of problems encountered in laboratories, content analysis, science and technology teachers' views

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### Introduction

It is commonly agreed that there is a close relationship between economical development level and scientific and technological development level. In recent decades, the advances in the fields of science and technology have become increased. With the accumulation of information, the attempts by individuals to access more information have increased. Societies need individuals who can research, question and investigates critically, think critically, solve the problems they come across, produce and who want to increase their share from the value-added things produced by others (Eryaman, 2007). Science education plays significant role to educate such individuals. There are different definitions of science. For instance, Işman et. al. (2002) argue that "science is the practice of scientific thinking in order to think scientifically and to solve daily life problems."Doğru and Kıyıcı (2005) define science is a systemical analysis of nature and natural events and an attempt to predict those natural events which have not yet been observed. In the science and technology educational program, published in 2005, science was described as a discipline which tries to define and account for the physical and biological world and a way of research and thinking which depends on experimental criteria, logical thinking and questioning continously.

Based on these definitions, it can be stated that science whose source is nature helps to explain the natural world. Therefore, science is a vital part of life. In addition to, science deals with both living beings and inanimate objects and science includes facts, concepts and generalizations, principles, rules and natural laws (Doğru and Kıyıcı, 2005). In this way, science contributes to human development through the improvement of scientific knowledge and understanding. Even though science may be understood as very complex at first sight, it is a method which provides reasonable explanations about the events in the world (Bybee et. al. 1989). At the same time, science is a dynamic and creative activity.

The goals of the AAAS (1989) were to improve scientists' studies, cooparate their relations, improve both academical freedom and responsibility, develop science education, encourage a better understanding related to nature of science, scientific research and technology. Nearly all daily life situations students come across are covered in the science courses (Ekim 2007). Therefore, students should be educated effectively in science courses (İşman et. al. 2002; Kaptan, 1998). Since science courses help students to improve their skills related to understand and explain themselves and their environment and to regulate their relationships with this environment. Subjects in science are mainly abstract and complex so one of the basic goals of the laboratory usage is to provide concrete experience to teach these subjects (Morgil, Güngör, Seyhan and Seçken, 2009). Science laboratories are centers designed to make students understand the scientific concepts and acquire the science process skills (Hofstein, Nahum & Shore, 2001).

Contemporary understanding of the science laboaratory regards laboratories as a learning centers in which students make research about they learned theoretical scientific concepts in the course, design experiments to prove their findings and develop significant connections between theory and practice (Tatar, Korkmaz and Ören, 2007). In addition, science laboratories are unique learning environments where students work in small groups to search for scientific events. The basic goal in laboratory practices is to make students understand the scientific concepts, improve their problem-solving skills, acquire scientific habits and understand the nature of science (Hoffstein and Lunetta, 2003). In this way students are given an opportunity to be familiar with the scientific process. Laboratory activities are based on active participation of students in the analysis of facts and in the process of data collection. These activities provide them with the opportunity to understand the basics and methods of science, improve their problem-solving skills, make analyses and generalizations, acquire scientific knowledge and develop positive attitudes towards science (Tamir, 1997; cited in Koray, Köksal, Özdemir and Presley, 2007).

## International Journal of Progressive Education, Volume 11 Number 3, 2015 $\ensuremath{\mathbb{C}}$ 2015 INASED

There are numerous studies dealing with the efficacy of the laboratory activities (Kirschner & Meester, 1988; Hofstein, Nahum & Shore, 2001; Hofstein & Lunetta, 2003; Hofstein & Naaman, 2007).

There are conflicting views about laboratory education that whether it is necessary or not. For instance, Kirschner &Meester (1988) argued that laboratory-based education is cost-effective in terms of both human power and material and that it is not a valuable learning experience for students.

In recent years, activity- and experiment-based approaches in science education have become significant as a result of the intense attempts to use of the student-centered and constructive approaches in science. Therefore, future science educators should have necessary skills to meet these needs (Erökten, 2010). Science teachers are regarded as key players in order for the science course to achieve desired objectives (Yıldız, Aydoğdu, Akpınar and Ergin, 2006).

In order to reduce the problems experienced during the activities carried out in laboratories the knowledge, experience and skills of teachers in laboratory practices are very significant. One of such problems is the accidents occurred during the experiments. The following is two excerpts from the websites showing news about accidents experienced in experiments in the schools in Turkey.

## Case 1

# MERCURY TUBE BROKEN DURING THE EXPERIMENT; 24 STUDENTS POISONED

In Kayseri 24 elementary science education students were poisoned when gas mercury tube was broken and gas diffused during the experiment. Based on the reports during the laboratory experiment which was conducted by the sixth grade students and mercury tube fell down and was broken in Taşhan village of Yahyalı district. 24 students were poisoned from the gas diffused and were brought to Yahyalı public hospital. They were transferred to an university hospital Kayseri following the first intervention in the cottage hospital. They were discharged from the hospital after they were observed for a while. Yahyalı perfect İdris Bıyık reported that the students do not experience any life-threatening situation and they returned to the village.

http://www.aktifhaber.com/24-ogrenci-zehirlendi-203100h.htm Retrieved: 02 / 01 / 2012
# Case 2

## **BURNING DURING THE EXPERIMENT**

The alcohol used by elementary science education students in an experiment caught fire and four students' various body parts were injured. During the experiment which was conducted by fifth grade students and science teacher, alcohol used caught fire in Doğancı village of Bolu.

The students who are Murat İpek, Burcu Koçak, Deniz Koç and İsmail Okay were injured. They were brought by the teacher and school administrators to the cottage hospital in the village. They were transferred to an university hospital in Bolu following the first intervention. In the hospital three students were out patiented and one was taken to the burn service.

Physician Opr. Dr. Rüya Ayşe Çelik reported that three students were sent to their homes after the treatment. She said that "one student is treating here since his burns are deeper and that his hands and back were burned at the degrees of first and second".

'Alcohol Poured When Fire Was About to Extinguish '

Murat İpek, 10 years old, whose hands and back were burned reported that they were conducting an experiment about how stream rotates the wheels in science and technology course and that they would heat the water in tubes. He continued to tell that their first attempt was unsuccesful and later they managed to began to heat the water. However, the fire was about to extinguish so the teacher poured alcohol and all tubes caught fire.

http://www.tumgazeteler.com/?a=1812152], Retrieved: 13/ 04 /2011

As cases one and two show accidents in science laboratories are likely to occur. In order to minimize these accidents necessary precautions should be taken. Identifying the causes of such accidents may contribute to minimize them. This study is significant in that it attempts to reveal the causes the accidents experienced in laboratories and the necessary precautions to be taken. In addition, the findings of the study may inform both teacher training institutions and schools about such undesired experiences in schools.

# Aim of the Study

The aim of the study is to identify the views of the science and technology teachers about the problems experienced during the laboratory activities. In parallel to this aim, the study attempts to answer the following research question:

What are the views of the science and technology teachers about the problems experienced during the activities carried out in laboratories?

# Method

## **Design of the Study**

The study was designed based on the principles of phenomenology which is one of the qualitative research techniques. The design for phenomenological studies focuses on the facts of which we are aware and about which we do not have detailed understanding (Yıldırım and Şimşek, 2008).

## **Participants**

In qualitative research there are purposive sampling techniques. Purposive sampling techniques provide researcher with an opportunity to analyse significant situations in-depth (Patton, 2002). More specifically the participants of the study were determined through the use of the maximum diversity and easily accessible sampling techniques which are part of the purposive sampling techniques. In the maximum diversity sampling technique the aim is to construct a small-size sampling and to maximize the diversity of the participants which are closely related to the problem at hand (Yıldırım and Şimşek, 2008). Participants of the study were 21 science and technology teachers. They were working in the elementary science education schools in Eskişehir province during the spring semester of the school year of 2010-2011. They were chosen based on their experience and the characteristics of the schools they were working in. These science and technology teachers were working in twelve different elementary education schools. Their demographical characteristics are given in Table 1 as follows:

Table 1.

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Characteristic		Ν	%
Experience	0-10 years	10	47.6
	11-25 years	4	19.1
	26 years or more	7	33.3
Graduation	Faculty of Education	12	57.1
	Institute of Education	8	38.1
	Faculty of Arts and Sciences	1	4.76
Gender	Female Male	12 9	57.1 42.9
TOTAL		21	100

Demographical characteristics of the participants

Table 1 presents the demographical characteristics of 21 science and technology teachers participated in the study. In regard to the teaching experience it was found that 47,6% of the participants had a teaching experience of 0-10 years. Those with the experience of 11-25 years were found to be 19,1% of the participants. It was also found that 33,3% of them had a teaching experience of 26 years or more. Concerning the origin of graduation it was found that more than half of the teachers were the gradutes of the faculty of education (57,1%). Those who were the gradutes of the educational institutes were found to be 38,1% of the participants. It was also determined that only 4,76% of them were the graduates of the faculty of arts and sciences. In relation to the gender it was found that female teachers were more than male teachers (57,1% and 42,9%, respectively).

## **Data Collection Tools**

In order to identify the views of the science and technology teachers about the problems experienced in laboratories, semi-structured interview form was used. The interview form is consisted of three sections of which the first one included items about the demographical characteristics of the participants. The second section covered items about the accidents in the laboratories. The last one was

composed an open-ended item concerning the causes of the possible accidents in the laboratories. The answers of this item were written by the students.

## **Data Analysis**

The answers of the science and technology teachers participated in the study to the open-ended item were analysed through content analysis which is one of the qualitative data analysis techniques. Firstly, the interview forms of the participants were numbered. Then, similar concepts and themes used in these forms were identified (Yıldırım ve Şimşek, 2008). Themes identified were divided into sub-themes in parallel to the aim of the study. In order to establish the reliability of the coding these codes were analysed by a field specialist. There was an agreement between the original codes and those produced by the specialist.

## Findings

This section presents the findings on the views of the science and technology teachers about the problems experienced in the laboratories as well as the discussion these findings. The views of the participants about the problems experienced in the laboratories are found to be categorized around six themes as follows: teacher-related problems, student-related problems, practice-related problems, security-related problems, material-related problemsandlaboratory-related problems. The findings about each theme with its subthemes are given in the following tables.

Table 2.

Teacher-related problems

Themes	Sub themes	f	%
Teacher	Educational background	6	28,
	Knowledge of subject matter	8	6
	Practical skills	7	38, 1
	Professional knowledge	5	33.
	Financial support	1	3
			23, 8
			4,8

Table 2 presents that regarding the teacher-related problems in laboratories. 38,1% of the participants stated that such problems occur due to poor knowledge of teachers about their subject matter. Some participants also reported that these problems are the result of poor practical skills of teachers (33,3%). There were some participants who stated that such problems are experienced due to poor educational background in regard to the use of laboratories (28,6%). The others reported that poor professional knowledge of teachers leads to these problems (23,8%). One of the participants stated that no extra time and financial support were also related to such problems (4,8%).

# International Journal of Progressive Education, Volume 11 Number 3, 2015 © 2015 INASED

In addition these numerical data the answers of the participants to the open-ended item are also given the following is an exemplary statement for the participants who regarded the poor educational background of teachers as a reason for the problems occured in laboratories: "I think that the reason for the accidents occured in laboratories is the lack of necessary knowledge of student teachers about chemicals or other laboratory."

Some of the participants reported that the accidents in the laboratories occur due to insufficient knowledge of teachers about their subject matter. One of these teachers expressed his view as follows:

In the teacher training programs we were given only theoretical knowledge in regard to chemistry education. In addition, I think accidents occur when teachers try to carry out the experiments without any significant preparation.

Some participants remarked that these problems are the result of poor practical skills of teachers in relation to the activities in laboratories. The following is an example for such views: "The accidents occur when teachers do not prepare the materials to be used in experiments in advance."

There were also participants who reported that poor professional knowledge of teachers leads to these problems. This view was expressed as follows "The problems in laboratories are experienced since teachers cannot control the many students' movement there."

One of the teachers participated in the study reported that no financial support was also related to such problems. She reported that "There is no extra time and financial support for teachers to design the experiments."

Based on these findings it may argued; that most of the problems experienced in laboratories occur due to poor knowledge of techers in subject matter, poor practical skills and professional knowledge of teachers and lack of financial assistance. Such problems appear to be experienced because of their preservice and in-service training.

Table 3 shows there two main themes in regard to the student-related problems observed in laboratories, namely uncontrolled student curiosity and students' poor background information. More specifically, 33,3% of the participants regarded the curiosity of students leads to these problems, whereas 9,5% of them considered students' poor background information as a principal cause for such problems. The following quotations exemplify such views as follows: "...Students are extremely interested in chemicals and want to work with chemicals in laboratories without giving permission from teachers.", and "The problems in laboratories occur since students unconsciously intervene the experiments."

Theme f Sub themes % 2 9.5 Students Curiosity Lack of background information 8 33,3

 Table 3.Student-related problems

One of the factors affecting the success of the laboratory-based activities is related to the knowledge-base of the people about topic to be studied in laboratory. If they have poor theoretical knowledge about the topic the possibility to have a successful laboratory experience is quite low(Aydoğdu, 1999). The student-related problems experienced in laboratories include the topics of curiosity and lack of information. Given that students first come across laboratory practices at the primary and elementary science education level they may have an extreme interest in these activities.

Tablo 4. <i>Practice related</i>	problems		
Themes	Sub themes	f	%
Practice	Group	1	4,8
	Care		10
47,6			
29 6	Rules		6
28,0	<b></b> .		1
4,8	Time		1

Table 4 shows that the practice-related problems in laboratories are categorized under four subthemes, namely group-related, care-related, rules-related and time-related problems. It was found that 47,6% of the participants considered the lack of necessary care lead to such problems. There were also participants who regarded the rules as the cause for these problems (28,6%). The factors of time and group were also given as the reasons for the problems (4,8% each).

The following statements are the examples of these views: "Given that there are time constraints teachers try to complete more than one experiment in one class hour.", "Problems occur because of lack of necessary care and rigor during the experiments.", "Because students do not follow the rules during the experiments." and "Experiments are not conducted in small groups. "Practice-based problems experienced in laboratories are stated by the participants as a result of students' work individually or in a group, lack of care during the experiments, not following the rules about experiments or laboratories and time constraints. Yıldız, Aydoğdu, Akpınar and Ergin (2006) in their study, elementary science teachers' attitudes towards laboratory activities, concluded that teachers have "undecided level" attitudes for the items about the cost of experiments. Aydoğdu (1999) concluded in his study, the identification of difficulties encountered in chemistry lab, that students interviewed also reported the negative effects of time constraints and poor theoretical knowledge on the practices carried out in laboratories. These findings are consistent with the findings of the present study concerning practice-related problems in laboratories.

Table 5 indicates that security-related problems include two major subhemes; namely precaution and guide about laboratory work. More specifically, of the participants 47,6% reported that the lack of precautions lead to the problems whereas 4,8% reported that the lack of guides is the reason for such problems. The following exemplifies these views: "All necessary precautions should be taken while carrying out the experiments", and "conducting experiments without reading hazardous chemical substances' usage guide.

Table 5.			
Problems related to secu	urity		
Themes	Sub themes	f	%
Security	Precaution	10	47,6
	Guide	1	4,8

Thus, the findings obtained indicate that both taking necessary precautions and using guides in the experimental process are significant in order to reduce the security-related problems.

Problems related to ma	iterials		
Themes	Sub themes	f	%
Material	Control	5	23,8
	Cleaning	2	9,5

As can be seen in Table 6 the material-related problems are two types, those related to control and those related to cleaning of materials. More specifically, 23,8% of the participants argued that poor control of materials lead to the problems while 9,5% of them stated that poor cleaning of materials is the couse of the problems. Such views are exemplified as follows: *"Problems occur because of the poor cleaning of the containers used in the experiments."* and *"Poor control of the experiment materials leads to problems."* Cleaning of the materials used in laboratories is very significant for both the health of individuals and for the correct results of the experiments. Therefore, materials should be checked before and after the experiments in order to avoid such problems.

Table 7.

Table 6

Problems related to laboratory

Themes	Sub themes	f	%
Laboratory	Lack of space	6	28,6
	Irregularity of space	3	14,3

As Table 7 indicates that the physical conditions of laboratories in relation to the problems experienced have two major subthemes; lack of necessary space in laboratories and irregular organization of the environment. Of the participants, 28,6% regarded the lack of necessary space in laboratories as the primary reason for the problems whereas 14,3% considered irregular organization of the environment as the main reason for the problems. These views are expressed as follows: "Problems occur in laboratories since laboratories are not large enough to provide the students with an environment where students can easily move and make their work in a comfortable manner. Therefore, they may collide one another during the experiments.", and "Laboratories are very small so that experimental organization cannot be provided as it must be."

# International Journal of Progressive Education, Volume 11 Number 3, 2015 © 2015 INASED

Students should have a comfortable work place while dealing with experiments to avoid accidents. Chemicals, glass equipments and other tools can be put on shelves in an organized manner and both teacher and students can easily access these materials whenever they need to use them. Such arrangements can reduce the laboratory-related problems.

Uluçınar, Doğan ve Kaya (2008) analyzed the views of teachers concerning difficulties experienced in laboratories in the context of the science education. They concluded that the most frequently reported problems by the participants included lack of necessary materials, poor laboratory conditions, crowded classes, time constraints in employing the laboratories and lack of guides in relation to the practices in the laboratory environment. This finding is consistent with the findings about the laboratory-related problems identified in the current study.

#### Discussion

The aim of the study is to determine the views of the science and technology teachers about the problems experienced during the activities carried out in laboratories. The findings of the study indicate that for the participants the problems in the laboratories occur due to six major reasons and these are teacher-related problems, student-related problems, practice-related problems, security-related problems, material-related problems and laboratory-related problems.

The participants mostly referred to the lack of care and of necessary precautions during the experimental work as the causes of the problems in laboratories. The rate of the teachers who expressed such views was found to be 47,6%. Nearly half of the participants stated that practices in the laboratories are not realized based on the proper laboratory procedures and that such practices lead to security problems. Therefore, these practices should be carried out in accordance with the rules to be followed before, during and after the laboratory work. Laboratory use techniques are defined as a scientific approach towards the problems experienced in the laboratories. Such problems are related to the safety of teachers, students, equipment and school. These teachniques also include the points about the technical specifications of equipment (Aydoğdu and Candan, 2012).

The next frequently factor stated by the participants regarding the problems in laboratories is about poor professional knowledge of teachers (38,1%). The other frequently factor is poor practical skills of teachers (33,3%). The rate of the participants who considered poor teacher training, students' not following the rules and lack of necessary space in laboratories was found to be 28,6%. The least reported factors were as follows: low income, conducting experiments in large groups, time constraints and lack of guides about the use of chemicals (each 4,8%). Özden (2007) attempted to identify the problems in chemistry courses. In the study it was found that some of the teachers regarded the laboratory work as wasting time due to the poor physical conditions and the lack of materials and equipment, the current educational program and the significance of the central examinations. Teachers also reported that implementation of laboratory work is very difficult to perform. Ekici (2002) found a correlation between the attitudes of biology teachers towards the laboratory work and the laboratory facilities. It was also found teachers who worked at the schools with better laboratory conditions had much more positive attitudes towards laboratory work. The findings of the study carried out by Özden (2007) and Ekici (2002) are consistent with the findings obtained in the present study. It is important to make laboratories research-based learning environments which have the advantages of learning through doing, active participation, meaningful learning, improvement of science process skills (Tatar, Korkmaz and Ören, 2007).

## Conclusions

The obtained findings indicate that in order to reduce the problems observed in the laboratories, the related laboratory usage techniques should be taken into consideration in carrying out experiments. Teachers must do necessary work before, during and after the experiments. The views of other groups of teachers about the problems in laboratories should also be studied. Therefore, similar studies can be carried out with other groups of teachers who also employ laboratories in such courses as physics, chemistry and biology and their views about the accidents occured in laboratories can be revealed. In addition, laboratories may be organized in a manner that there is necessary equipment and tools. Laboratory guides can be developed for the use by teachers and students. In-service training activities can be organized for teachers may be well-equipped in term of the teachniques to be followed in such learning activities.

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# The Correlation between Organizational Commitment and Occupational Burnout among the Physical Education Teachers: The Mediating Role of Self-Efficacy

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## Abstract

The aim of the current study was to examine the correlation between organizational commitment and occupational burnout among the physical education teachers and to determine the mediating role of their self-efficacy perceptions in this relational status. This was a relational study and conducted with cross-sectional method. Sample group was composed of 325 physical education teachers. The relational status among the variables was analyzed with correlation and multiple linear regression analyses. As the result of the study; it was found out that there was a negative correlation between organizational commitment and occupational burnout of the physical education teachers. Besides; it was also identified that there was a negative correlation between teachers' self-efficacy perceptions and their occupational burnout but a positive correlation between their self-efficacy and organizational commitments. It was discovered that teachers' self-efficacy perceptions played a mediating role between their organizational commitment and occupational burnout.

Key Words: organizational commitment, occupational burnout, self-efficacy

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## Introduction

It is only possible with an educational system compatible with the changing and advancing conditions of the age that individuals and societies can economically, politically, culturally and socially progress. The most important part of this system is the teachers who change students' behaviors positively and educate tomorrow's qualified manpower in line with the necessities of the time. However: they should cope with many problems and difficulties such as frequently changed educational policies, teacher-student conflicts, school-family conflicts, disciplinary problems of the students, overcrowded classrooms, insufficient physical conditions, lack of equipment and tools, lack of sportive fields and educative materials, low salaries and problematic promotion mechanism. All of these problems may cause the teachers to experience feeling of occupational inadequacy, occupational alienation, decreased organizational commitment, increased occupational stress and occupational burnout. Burnout leads to negative outcomes in terms of individual and organizational context. Having chronic health problems, fatigue, exhaustion, sleep disorders, excessive weight gain or excessive weight loss, excessive caffeine consumption, use of alcohol, smoking or sedatives, increasing social problems are among the individual results of burnout. In addition; decreasing occupational performance, increasing occupational absenteeism, conflicts, decreasing occupational satisfaction and organizational commitment experienced by the teachers are organizational results of burnout (Maslach and Jackson, 1981; Maslach et al., 2001; Maslach, 2003; Cetin et al., 2011).

We are of the opinion that determination of the relation between organizational commitment and occupational burnout, and mediating role of the self-efficacy perception in this relational status will help in order to prevent, to eliminate or to decrease all of these negative results caused by burnout. From this point forth; the basic aim of the study was to examine the correlation between organizational commitment and occupational burnout among the physical education teachers and to determine the mediating role of their self-efficacy perceptions in this relational status. In literature; there are studies concerning teachers' organizational commitment, self-efficacy and burnout. Yet; it is understood that most of these studies have been undertaken in western countries (Pillai and Williams, 2004; Yu et al., 2014; Cohen and Abedallah, 2015). It is not possible to claim that results of the studies undertaken in western countries are valid for Turkiye due to cultural and social differences. In Turkiye; the number of the studies that examine the correlation among occupational burnout, organizational commitment and self-efficacy of the physical education teachers is rather limited. Therefore, it is important that these subjects having been investigated more detailedly by western studies should be examined and their results should be discussed in other countries, too, in order to generalize the results for those countries with different cultural and social structures. Besides; as for the relational status between organizational commitment and occupational burnout of the physical education teachers, no study that investigates the mediating role of self-efficacy perceptions has been seen so far. From this aspect; the current study was an important and distinctive one that would fill a gap in literature.

#### **Conceptual framework**

#### **Burnout**

The term burnout was first referred in a novel "A Burnout Case" written by Greene in 1961 (Maslach et al., 2001). Later, with the definition made by Freudenberger (1974) the term burnout has been introduced into the literature. Freudenberger (1977) defined burnout as to fail, to wear out or to become exhausted by making excessive demands on energy, strength or resources and described it as a professional danger that all of the occupational groups may face. The most common and recognized definition of burnout was made by T Maslach and Jackson (1981) and they defined burnout as a syndrome that is seen among people who are exposed to intense emotional demands and work with others face to face as a part of their job and that involves negative attitudes towards work, life and others as a

# International Journal of Progressive Education, Volume 11 Number 3, 2015 © 2015 INASED

result of physical burnout, long term exhaustion, hopelessness and helplessness feelings. Maslach and Jackson (1981) described burnout as emotional exhaustion, depersonalization and feeling of low personal achievement among those who due to their occupation are in close interaction with other individuals and explained these dimensions as follows:

Emotional exhaustion is the feeling that one is emotionally worn out due to the job, suffers from energy depletion and is psychologically unable to devote himself to his job. Depersonalization is one's being indifferent to his workmates with whom he is interacted and to whom he serves; low feeling of achievement is one's feeling that he is not successful in his job and he is less competent (Maslach and Jackson, 1981; Maslach et al., 2001).

## **Organizational Commitment**

When the literature on organizational commitment is examined, it is possible to see many different definitions of organizational commitment. The reason is that having drawn the biggest interest among the modern management terms, organizational commitment has been studied by many authors from different disciplines -like management, sports, education, sociology, psychology, etc.- in relation with their specialty. According to Becker (1960); organizational commitment is one's disposition for the integration into the organization with organizational deeds. Meyer and Allen (1991) explained organizational commitment as a psychological state that shapes personnel's relation with the organization and has an effect upon whether or not the personnel should continue their organizational memberships. Generally speaking; organizational commitment may be described as employees' desire to stay in organization and commitment to organizational objectives and values (Seymen, 2008). Meyer and Allen (1991) clustered organizational commitment into three dimensions: normative, affective and continuance commitment (Allen and Meyer, 1990). Affective commitment is defined as the employee's sensual and emotional attachment to the organization and the employee identify and unite himself with the organization, becomes a part of the organization and remains being a member of the organization. In continuance commitment, an individual cannot risk the costs of a possible losing organizational membership if he leaves the organization. Continuance commitment may be continued either due to lack of other alternatives or the amount of the investment made in the organization being big. Finally; in the normative commitment the individual thinks that he is obliged to remain with the organization because he believes in the responsibility for the organization and gratitude is internalized such that the individual feels that he should stay in the organization (Allen and Meyer, 1990; Cetin, 2004).

## Self-efficacy

Theoretical basis of self-efficacy term lies in social cognitive theory developed by Albert Bandura (1977; 1997). Self-efficacy term and its study field are based on behavioral changes and were first introduced by Albert Bandura. It is emphasized that beliefs people have affect their motivational level, emotional status and behaviors. It is argued that in relation with performing a behavior successfully, self-efficacy belief of a person affects and directs how he can perform that behavior (Bandura, 1977; 1997).

Self-efficacy is defined as "beliefs in one's capabilities to organize and to execute the course of action required to produce the given attainments successfully" (Bandura 1994). Self-efficacy is based on the beliefs in our capacity. It is needed to organize and to execute the course of action required to produce the given attainments (Schmitz and Schwarzer, 2000). Self-efficacy is the function produced by people's capabilities as well as by all of their judgments that they can execute using their skills (Gürcan, 2005). It is reported that self-efficacy beliefs can be utilized in educational field, in explaining individual differences, in teaching activities done by teachers and may contribute a lot to understanding and improving teacher behaviors (Enochs and Riggs, 1990; Pajares, 1997). Teacher self-efficacy perceptions

International Journal of Progressive Education, Volume 11 Number 3, 2015 © 2015 INASED

point out a teacher's beliefs that he can successfully fulfill teaching function (Guskey and Passaro, 1994, Eryaman at al. 2013). The studies conducted have demonstrated that teacher self-efficacy perceptions affect teaching and learning, particularly teachers' classroom practices. It is regarded that teacher self-efficacy perceptions are one of the most important factors that predict their teaching capabilities (Tschannen-Moran et al., 1998; Schmitz and Schwarzer, 2000).

#### The Correlation among Burnout, Organizational Commitment and Self-efficacy

In literature are studies that investigated the correlation among self-efficacy, burnout and organizational commitment (Pillai and Williams, 2004; Yu et al., 2014; Cohen and Abedallah, 2015). When some of these studies are examined, Klassen et al. (2013) determined there was a positive correlation between candidate teachers' commitment and their self-efficacy but a negative correlation between their commitment and stress. Yu et al. (2014) found out that there was a negative correlation between teachers' self-efficacy and their occupational burnout and that their self-efficacy perceptions played a mediating role in their burnout. Hakanen et al. (2006), Salehi and Gholtash (2011), Tekin et al. (2014) reported that occupational burnout reduced as commitment increased. These studies in literature state that a correlation exists among self-efficacy, burnout and organizational commitment. In this sense; for the current study the following hypotheses were developed.

H<sub>1</sub>: There is a negative correlation between self-efficacy and occupational burnout.

H<sub>2</sub>: There is a positive correlation between self-efficacy and organizational commitment.

H<sub>3</sub>: There is a negative correlation between organizational commitment and occupational burnout.

 $H_4$ : Self-efficacy perceptions execute a mediating effect upon the relation between occupational burnout and organizational commitment.

In line with these hypotheses; the research model was presented in Figure 1.



Figure 1. Conceptual Model of the Research

## **Material and Method**

This was a relational study and conducted with cross-sectional method. A questionnaire form was designed by the researcher to obtain the data.

### **Population and Sample**

With acceptable error limit of 5% and 90% confidence interval; the sample size for the current study should be 268 and sample size of the study was 325. The sample group was composed of 325 voluntary physical education teachers who worked in 15 provinces in different geographical regions of

Turkiye. The ages of the participant physical education teachers ranged between 22 and 57 and average age was  $35.09\pm6.62$  years. 94 of the teachers were female and 231 were males. 91 of the teachers were single while 234 were married.

#### **Data Collection Method**

The data of the study were collected using a questionnaire form composed of demographic information, self-efficacy, occupational burnout and organizational commitment scales. **Burnout scale:** In order to measure burnout levels, the short form of the scale developed by Pines and Aronson (1988) was employed. The short form of the scale was designed and its validity and reliability tests were performed by Malach-Pines (2005). The scale consists of 10 items and is one-dimensional scale with 7 point Likert type. High scores indicate burnout. Cronbach's Alpha internal consistency coefficient calculated for the current study was 0.90. **Organizational commitment scale:** In order to measure organizational commitment levels of the teachers; the scale developed by Allen and Meyer (1990) was used. The scale is consisted of three subscales (normative, affective and continuance commitment) and 18 items. In the current study; subdimensions were not used and organizational commitment was evaluated with total item scores. A factor analysis was made for the current study was 0.80.

## **Self-efficacy Scale**

Self-efficacy scale which was developed by Yıldırım (2012) and later revised by Yıldırım (2015) was employed. The scale consists of 33 items with 5 point Likert type. It is clustered into 9 subscales. The subscales were not used in the current study and self-efficacy was evaluated through total/item score. Cronbach's Alpha internal consistency coefficient calculated for the current study was 0.92.

### **Analyzes of Data**

The data were assessed with SPSS software package program. First; descriptive statistical assessments were performed for the data analyses. The relational status among the variables was analyzed with correlation and multiple linear regression analyses. In the multiple linear regression analyses, Stepwise method was used. Hypotheses in the multiple linear regression analyses were tested. Tolerance (0.826) and VIF (1.210) were within acceptable limits. Durbin-Watson coefficient (1.784) was used in order to test autocorrelation. It was determined that regression model did not demonstrate any multicollinearity and autocorrelation problem. Results were considered significant at p<0.05 with 95% confidence interval.

#### Results

It was found out that there was a negative correlation between physical education teachers' occupational burnout, and their organizational commitments (r=-0.531) and their self-efficacy (r=-0.460). Also; a positive correlation existed between the teachers' self-efficacy and organizational commitment (r=0.425).

According to the stepwise regression method; organizational commitment accounted for occupational burnout considerably (p<0.01). Organizational commitment explained 26% of occupational burnout alone ( $R^2$ =0.260). Accordingly; first stepwise regression model was constructed as follows (Table 4):

## Burnout=4.727-0.808 x Organizational Commitment

## Burnout= 6.835-0.601 x Organizational Commitment- 0.384 x Self-efficacy

In the first step of Stepwise regression model; organizational commitment explained 26% of the occupational burnout whereas in the second model into which self-efficacy was included, self-efficacy explained 34.1% of the occupational burnout together with organizational commitment variable. According to these results; it was concluded that self-efficacy perceptions of the teachers played a mediating role in the relation between teachers' organizational commitments and their occupational burnout by contributing 8% to this relational status (Appendix:Table 4, Graphic 1).

## **Discussion and Conclusion**

Today, the quality and level of education have been increasing day by day due to economic and technological advancements and increasing competition; which -in turn- results in increased tasks and responsibilities on education laborers. Doubtlessly; the most affected group by these developments is teachers. Teachers are supposed to constantly improve themselves and to make extra efforts in order to comply with these increasing competition and educational level. Besides; they need to overcome many problems, difficulties and conflicts while they are performing their professional tasks (Eryaman, 2007). That the teachers try to overcome many problems and difficulties while they are performing their professional tasks and responsibilities may cause them to be negatively affected in physical, mental and psychological sense; which leads to reduced organizational commitment and increased occupational burnout among them. Those who experience decreased organizational commitment and increased occupational burnout feel inadequate, become alienated to the profession and thus their performances slow down. In the studies done; it is reported that teachers with occupational burnout suffer from lower occupational satisfaction (Koustelios and Tsigilis, 2005; Skaalvik and Skaalvik, 2009) and decreased organizational commitment (Salehi and Gholtash, 2011; Tekin et al., 2014). In the current study; the correlation between organizational commitment and occupational burnout among the physical education teachers was examined and the mediating role of their self-efficacy perceptions in this relational status was examined. According to the results of the current study; it was identified that there was a negative correlation between teachers' organizational commitments and occupational burnout (Table 1); which concurred with the similar studies in literature (Hakanen et al., 2006; Salehi and Gholtash, 2011; Tekin et al., 2014). Being extremely important for the organization; organizational commitment is affected by numerous organizational and personal factors such as age, marital status, organizational justice, gender, trust, occupational satisfaction, role ambiguity, role conflicts, non-participation in decision-making process, promotion opportunities, salaries and leadership (Balay, 2000; Cetin, 2004; Tekin et al., 2014). All of these personal and organizational factors affect emotional commitments of the teachers to the schools where they work negatively; generate such occupational reluctance and disinterest such as being late for classes and taking unnecessary day off and sick-leaves in addition to occupational absenteeism and reduce their organizational commitments. Thus; teachers who demonstrate work-negligence become subjected to the objections and reactions from school administrators, students' parents and colleagues. We are of the opinion that occupational stress levels of those teachers who show lowered organizational commitments and work-negligence and receive negative reactions increase and they experience occupational burnout. Occupational burnout of teachers causes lowered occupational enthusiasm, amotivation and occupational alienation (Akman et al., 2010) and end up with reduced organizational commitment; which indicates that burnout and organizational commitment are closely interrelated.

Occupational burnout that emerges because of the problems and difficulties teachers encounter while they are performing their professional tasks and responsibilities can only be coped with professional background composed of knowledge, skills and qualifications and teachers' belief that they can meet the necessities and requirements of the teaching profession (self-efficacy) (Enochs and Riggs, 1990; Bandura, 1977). To put it in other words; teachers that encounter burnout due to personal and organizational reasons can defeat burnout using their self-efficacy perceptions. Indeed; as far as the results of the current study were concerned; it was found out that there was a negative correlation between teachers' self-efficacy perceptions and their occupational burnout levels but as their self-efficacy perceptions increased their burnout decreased (Appendix:Table 1). The studies in literature supported this result, too and pointed out that a negative correlation existed between self-efficacy and burnout and people's self-efficacy perceptions decreased their occupational burnouts (Skaalvik and Skaalvik, 2010; Yu et al., 2014; Cohen and Abedallah, 2015; Telef, 2011).

Organizational commitment –which is negatively correlated with occupational burnoutdemonstrates a positive correlation with self-efficacy. According to the study results; it was explored that as self-efficacy increased so did organizational commitment level (Table 1); which was in agreement with the studies done by Kang and Kim (2014), Klassen et al. (2013) and Pillai and Williams (2004) in literature. In relation to this result; we could suggest that teachers' educational efforts, enthusiasm and objectives increased thanks to their self-efficacy beliefs. One of the most major results determined in the current study was that self-efficacy perceptions played a moderating role in the relation between organizational commitment and burnout (Table 4); which will fill an important gap in the relevant literature.

Organizational commitment positively affects occupational satisfaction, motivation, occupational participation, desire to stay in organization, organizational commitment and organizational citizenship behavior and prevents job switches and occupational absenteeism. Generally speaking; since organizational commitment is one's desire to make more efforts on behalf of the organizational benefit; it is natural that these efforts are transformed into performance (Balay, 2000; Seymen, 2008). As to occupational burnout; it leads to fatigue, insomnia and some psychosomatic disturbances among the teachers. Teachers with occupational burnout lose their interest and excitement in students, school and teaching profession and thus occupational burnout causes the teachers to disrupt educational services, to become alienated from teaching profession, to show decreased level of organizational commitment and to withdraw teaching profession (Akman et al., 2010). Therefore; occupational burnout and low level of organizational commitment suffered by teachers are unwanted consequence in an effective education system. When negative results of occupational burnout and positive results of organizational commitment are considered; it is highly crucial that teachers' occupational burnout should be minimized and their organizational commitments should be maximized in the name of enhancing educational quality. In this regard; self-efficacy perceptions that play a mediating role in the relation between burnout and organizational commitment become important. Depending on self-efficacy perceptions; teachers' educational efforts, enthusiasm and objectives vary. Self-efficacy beliefs influence teachers' way of thinking, problems solving skills and emotional reactions. Teachers with low self-efficacy regard things as if they were more difficult than they are and their problem solving skills are rather limited. Yet, teachers with high self-efficacy are more confident and resolved and demonstrate higher level of problem solving skills when they come across a difficult task (Enochs and Riggs, 1990; Pajares, 1997; Tschannen-Moran et al., 1998; Schmitz and Schwarzer, 2000). When teachers with high self-efficacy perceptions meet problems and difficulties while performing professional tasks and responsibilities they will make more efforts in a more confident and determined way and thus cope with these problems and difficulties; and thus their organizational commitments will increase but occupational burnouts will decrease. Moreover; depending on self-efficacy levels; the increasing organizational commitment will end up with

# International Journal of Progressive Education, Volume 11 Number 3, 2015 © 2015 INASED

reduced burnout. In this sense; self-efficacy perceptions, which are associated with these two variables and play a mediating role between them, are extremely important. Teachers that do not suffer from occupational burnout but show high organizational commitment and self-efficacy will enhance student success and motivation and provide effective educational services.

In sum; it was found out that there was a negative correlation between organizational commitment and occupational burnout of the physical education teachers and their self-efficacy perceptions played a mediating role in this relational status. We could suggest that this result will fill an important gap in literature. We were also of the opinion that the current study would help the prospective studies that would investigate the moderating role of teachers' self-efficacy perceptions in the relation between organizational stress and burnout.

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# Appendix

	Cronbach's	Mean±S.d	Occupational	Organizational
	Alpha (α)		Burnout	Commitment
Occupational Burnout	0.902	2.00±0.92	-	-
Organizational Commitment	0.807	3.36±0.58	-0.531*	-
Self-efficacy	0.923	7.30±0.75	-0.460*	0.425*

Table 1. Correlation results between descriptive statistics and variables

\*P<0.001 indicated a significant relation.

Table 2. Regression Analysis Results of the Effect of Organizational Commitment on Self-Efficacy

Variables	В	S.E	β	Т	R	R <sup>2</sup>	F	Р
Organizational Commitment	0.539	0.065	0.417	8.237	0.417	0.174	67.850	0.001*

\*P<0.001 indicated a significant relation.

Independent Variables: Organizational Commitment, Dependent Variables: Self-Efficacy

Table 3. Regression Analysis Results of the Effect of Self-Efficacy on Occupational Burnout

Variables	В	S.E	В	t	R	R <sup>2</sup>	F	Р
Self-Efficacy	-0.578	0.060	-0.472	-9.614	0.472	0.222	92.419	0.001*

\**P*<0.001 indicated a significant relation.

Independent Variables: Self-Efficacy, Dependent Variables: Occupational Burnout

Table 4. Results of Multiple Linear Regression Analyses: The relation between organizational commitment and occupational burnout and Mediating Role of Self-efficacy

Variables	В	S.E	β	t	R	$R^2$	F	Р
Organizational Commitment	-0.808	0.076	-0.510	-10.647	0.510	0.260	113.350	0.001*
Occupational Burnout	-0.601	0.079	-0.379	-7,615				
Self-efficacy	-0.384	0.061	-0.314	-6.306	0.584	0.341	83.361	0.001*

\**P*<0.001 indicated a significant relation.

Independent Variables: Organizational Commitment, Self-Efficacy, Dependent Variables: Occupational Burnout



Graphic 1. Occupational burnout according to stepwise regression models

 $1^{st}$  Model= Organizational commitment explained 26% of the occupational burnout.  $2^{nd}$ Model=Self-efficacy contributed to the model by 8% and explained 34.1% of the occupational burnout together with organizational commitment.

# **Comprehending Elementary School Teachers' Classroom Management Approaches**

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# Abstract

This study intends to determine elementary school teachers' degree of classroom control, which constitutes the consistency in their classroom management and discipline-related behaviour. The major research question was as follows: Is the control approach adopted by teachers related to certain variables (gender, age, subject area, experience)? The study design was based on descriptive and causal-comparative research methods. Research data were collected from 119 elementary school teachers. Results revealed that, in general, elementary school teachers adopted medium-level control. There was no statistically significant difference found between teachers' control approach and their age, gender, experience, marital status and subject area. If teachers are aware of the philosophy underlying their level of control and if they internalize it, their teaching behaviour is affected. Therefore, teachers can become informed and follow studies about their control approach.

Keywords: classroom management, discipline models, elementary schools, degree of control

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## Introduction

Parents whose children are about to start first grade usually embark on a quest for 'a good teacher' rather than 'a good school'. At this time, they question teachers' competencies in classroom management more than their other professional competencies. They encounter comments about a teacher, for example, 'S/he rewards as well as punishes', 'S/he does not compromise in discipline', 'S/he is like a friend to the kids', 'S/he has strong communication skills' and 'S/he is rules-oriented'. Parents strive to know the teacher based on similar comments, and parental sensitivity vis-à-vis the teacher's classroom management style and skills increases gradually. Then, they begin to confront the idea that 'very good teachers' can have wildly different classroom management styles.

The environment in which both teacher and students behaviours are displayed within an acceptable framework for effective learning is referred to as 'order'. Some teachers try to achieve success in the learning process by restricting students' behaviour within a limited framework, while others have a broad framework for promoting learning. The common goal of teachers with varying styles of classroom management, be it broad or restricted, is to promote all students to be task-oriented and ensure continuous improvement within this framework referred to as 'order'. Classroom management is the process by which the necessary order for effective learning and teaching is established, maintained and re-established when disrupted.

Students' level of freedom in the classroom (wide-restricted) and the teachers' degree of control (high-low) is a significant discussion topic in education. Some teachers grant wide freedom with a lower degree of control, whereas others impose significant restrictions on behaviour by adopting a high degree of control. The control levels of teachers range from 'low level' to 'high level'. Based on this difference, Glickman and Wolfgang (1980, p. 460) classified teachers' classroom management approaches as demonstrated in Figure 1.

Teacher Control		
Student Control		
Low Teacher Control	Medium Teacher	High Teacher Control
High Student Control	Medium Student	Low Student Control
Ļ	ţ	Ļ
Non-Interventionists	Interactionalists	Interventionists

Fig. 1. Teacher-student control continuum. Source: Glickman and Tamashiro (1980)

Teachers' practices were geared towards establishing and maintaining order in the classroom, as well as its re-establishment when it is disrupted, which are shaped to a great degree by the philosophies of education they espouse. Each internally coherent cluster of practices is referred to as a disciplinary model or classroom management approach. The degree of control wielded by the teacher or the student over classroom mechanics is regarded as the most significant factor in model formation. Classroom management approaches are thus classified as (1) low teacher control approaches, (2) medium teacher control approaches and (3) high teacher control approaches.

## Low Teacher Control Approaches

This is also referred to as the Non-Interventionist approach; the low teacher control approach upholds the idea that students possess intrinsic potential: They can make the right decisions in many matters relevant to them because of their inherent skills and features, without needing adults. Every

decision they make, right or wrong, serves their development. Therefore, instead of making decisions on students' behalf, teachers should create environments where students can decide for themselves, and teachers should consider their preferences and feelings in all processes. Since students possess intrinsic potential and the power to decide, they can control their behaviour. The teacher's duty is not to control the students' behaviour and impose rules but to create an environment where students can control their behaviour and impose their own rules. Burden (2006) indicated that in this philosophical approach, the teacher has a low level of control, whereas the students enjoy a high level of autonomy; however, this approach does not lead to confusion in the classroom. Ultimately, students determine behavioural standards, and the teacher is primarily responsible for implementing these standards so as to allow students to learn in an orderly environment.

Thomas Harris's (1969) Transactional Analysis Model, Jacob Kounin's (1970) Ripple Effect and Group Management Model, Haim Ginott's (1972) Discipline Through Congruent Communication Model and Thomas Gordon's (2003) Teacher Effectiveness Training Model are the leading noninterventionist disciplinary models.

## **Medium Teacher Control Approaches**

Also referred to as the Interactivist approach, the medium teacher control approach bears traces of both the non-interventionist and the interventionist approach. The idea that internal and external factors matter in student development underlies this approach. The student's intrinsic potential is acknowledged, yet students' behavioural control becomes the joint responsibility of the teacher and the student, due to the effect of external factors on students' development. The teacher's primary focus is on group behaviour and meeting the group's academic needs. This approach holds that rules and functioning need to be jointly developed by the teacher and students. Once rules have been established, the teacher should be responsible for ensuring that students abide by the rules and that they face rational consequences in the case of failure to do so. Cooperative discipline and democratic practices within the classroom bear importance in this approach.

Rudolph Dreikurs's (1972) Social Discipline Model, William Glasser's (1969) Reality Therapy Model and Linda Albert's (2003) Cooperative Discipline Model strongly reflect features of the interactivist approach.

## **High Teacher Control Approaches**

Also referred to as the Interventionist approach, the high teacher control approach defends the view that external factors are significant in students' growth and development and that external factors mould and shape students. In contrast to the low teacher control approach, this approach emphasises students' lack of intrinsic potential. The teachers determine right and wrong behaviour. Parallel to behaviourist theories, this approach advocates reinforcement of appropriate student behaviour and teacher intervention in the event of inappropriate behaviour. Teachers may resort to reward and punishment in necessary circumstances. According to this approach, teachers aim to channel students towards appropriate behaviour through the high level of control they maintain.

Lee Canter and Marlene Canter's (1976) Assertive Discipline Model and Frederic Jones' (1987) Positive Discipline Model are prominent examples of interventionist discipline.

Wolfgang and Glickman (1986) have summarized beliefs of three schools of thought regarding classroom management and discipline and showed it in a chart (see Table1).

Table 1

Classroom	Management	Annroaches
Ciussiooni	management	approaches

Interventionist (High Teacher Control)	Interactionalist (Medium Teacher Control)	Non-interventionist (Low Teacher Control)		
Teacher has primary responsibility for control	Student and teacher share responsibility for control	Students have primary responsibility for control		
Teacher develops the rules	Teacher develops the rules with some student input	Students develop the rules with teacher guidance		
Primary focus in on behaviour	Initial focus in on behaviour, followed by thoughts and feelings	Primary focus is on thoughts and feelings		
Minor emphasis on individual differences in students	Moderate emphasis on individual differences in students	Major emphasis on individual differences in students		
Teacher moves quickly to control behaviour	Teacher allows some time for students to control behaviour, but teacher protects right of the group	Teacher allows time for students to control behaviour		
Types of interventions are rewars, punishments, token economy	Types of interventions are consequences and class meetings	Types of interventions are non- verbal cues and individual conferences		

Source: Wolfgang and Glickman (1986)

Nevertheless, a teacher's classroom management style should not be expected to align completely with one of the three approaches explained above. The teacher might engage in practices characteristic of any approach during a classroom management period. However, the teacher's classroom management style will be perceived to have a dominant approach. Teachers should demonstrate coherence between the disciplinary approach they primarily believe in and the disciplinary approach they predominantly project in the classroom. This study aims to determine the disciplinary approaches held by primary school teachers and to compare these approaches to demographic variables such as gender, age, subject matter and school type.

## Methods

# **Participants**

The participants in this study were 119 elementary school teachers, of whom 78 (65.5%) were male and 41 (34.5%) were female. A large majority (%84) of participants work in private schools. Their average occupational experience is 12.5 years (SD = 11.9), and their teaching careers vary between 1 and 43 years.

## **Data Collection Tool and Procedures**

The 'Beliefs on Discipline Inventory (BDI)' developed by Tamashiro and Glickman (1980) was used to determine classroom management approaches adopted by participants. BDI is structured in such a way as to determine levels of control exhibited by teachers in a classroom setting as falling into either of the three different levels of 'low control', 'medium control' and 'high control'. BDI

includes 12 items, each with two choices of the 'forced choice' type, and the participants were required to mark the choice with which they agreed more. The examples of statements included in the inventory were presented below:

(1)

A. Generally, I assign students to specific areas or seats in the classroom (High Teacher Control).

B. Generally, my seating (or work area) assignments are open to negotiation (Medium Teacher Control).

(2)

If a student interrupts my lesson by talking to a neighbour, I will most likely:

A. Move the children away from other students and continue the lesson; class time should not be wasted on account of one student (High Teacher Control).

B. Tell students about my annoyance and conduct a discussion with students about how they feel when being interrupted (Low Teacher Control).

BDI includes three subscales representing the low, medium and high control levels. Of 24 choices drafted for the 12 items, each group of eight constitutes one subscale for the low control level, the medium control level and the high control level. Therefore, the lowest possible score for a subscale is zero and the highest possible score is eight. The subscale with the highest number of points represents the dominant control level.

The choices (A or B) that form the subscales were separately evaluated to determine the degree of selectiveness of items composing the data collection tool. A choice was scored with 1 point if marked and with 0 if unmarked. Scored items were thus added to obtain total scores for each control level. The correlation between item scores and total scores was calculated with biserial correlation to reveal item discrimination values. When a discrimination value of 0.20 is set as the benchmark, the items have discrimination values ranging from 0.22 to 0.56.

Administrations of the BDI were conducted in three separate sessions, each lasting approximately three hours. Researchers underscored that teachers do not react in the same manner to similar classroom situations and that some teachers have a wider frame of acceptance in relation to student behaviour, whereas others are more inclined to restrict student behaviour to a narrow framework; this difference in discipline approaches is normal, and it stems from different philosophical approaches adopted by different teachers.

Participants answered the inventory simultaneously during sessions and scored it according to the provided instructions. Teachers who scored highest in each subscale were asked to describe 'what kind of a teacher they were' without providing names for subscales, and the participants were asked to name each subscale (academic, analogous or spiritual), under which they described themselves, by considering features expressed by these teachers. Participants named each group in the following manner by considering descriptions. Table 2 demonstrates that the scale in which these appellations and analogies are used possesses the power to classify teachers according to their classroom management approaches.

In the next step, researchers indicated that the subscales were generally referred to as (1) low teacher control approaches, (2) medium teacher control approaches and (3) high teacher control approaches; the philosophical and conceptual foundations underlying these approaches were also shared. Participants were then asked to rank these approaches according to their proximity with their beliefs and to indicate to what extent they use these approaches in their classroom. A significant relationship (r = 0.522, p<.0001) was revealed between the participants' control levels measured via the inventory and their self-declared control levels indicated by reflecting on their existing practices. This finding indicates the scale's power to measure the intended feature

Table 2

Participants' Self-Descriptions Regarding Control Approaches

Low Teacher	Medium Teacher	High Teacher
Control Approaches	Control Approaches	Control Approaches
Tolerant	Equitable	Normative
Sweet	Collaborationist	Hard
Loving	Democrat	I Know
Concerted	Find a Compromise	Authoritative
Emancipatory	Accommodationist	Clear
Balance	Sharer	Interventionist
Mild-Mannered	Effective	Classic
Ease	Love	Disciplinarian
Student Centered	Medium	Teacher Centered
Entertaining	Me and My Students	Systematic
Extra Large?	Let's Deal First	Layout
Humanist	Modern	Sensible
Together	İnteractionist	Small
As You Say	Happy Together	Mother Hen
Creative	Ideal, Altogether	Let's Establish Rules
Baklava	Rock Candy	Traditionalist
Constitutional Monarchy	White Chocolate	I Got the Power
Milk Chocolate	Ocean	Perfectionist
Rain	Liquid	Semolina Helva
Plasm	Controlling Liberty	Absolute Monarchy
Low Control	Innovator	Bitter Chocolate
Unshelled Hazelnut	Medium Control	Cloud
	Pine Nut	Solid
		Mahmut Hoca
		High Control
		Walnut

# Findings

The evaluation based on subscales determined that a large majority of participants (72.3%) use the medium control approach. This approach is followed by teachers with the high level control approach (21%) and teachers with the low control approach (6.7%). Distribution of participants' control levels according to gender is presented in Table 3.

	Gender					
Control Level	Female		Male		Total	
	f	%	f	%	f	%
Low Level Control	4	5.1	4	9.8	8	6.7
Medium Level Control	56	71.8	30	73.1	86	72.3
High Level Control	18	23.1	7	17.1	25	21.0
Total	78	100	41	100	119	100

Table 3Distribution of Participants' Control Levels According to Gender

Table 4

As indicated in Table 4, when the mean and standard deviations of scores obtained from each subscale are considered, the medium level has the highest average, whereas the low and high level averages are quite close to each other.

Mean and Standard Deviations of Subscale Scores								
Female			Male			Total		
Ν	Х	SD	Ν	Х	SD	N	Х	SD
78	3.47	1.48	41	3.22	1.67	119	3.39	1.54
78	5.63	1.26	41	5.22	1.19	119	5.49	1.25
78	2.90	1.25	41	3.56	1.29	119	3.13	1.30
	Fema N 78 78 78 78	N         X           78         3.47           78         5.63           78         2.90	N         X         SD           78         3.47         1.48           78         5.63         1.26           78         2.90         1.25	N         X         SD         N           78         3.47         1.48         41           78         5.63         1.26         41           78         2.90         1.25         41	N         X         SD         N         X           78         3.47         1.48         41         3.22           78         5.63         1.26         41         5.22           78         2.90         1.25         41         3.56	N         X         SD         N         X         SD           78         3.47         1.48         41         3.22         1.67           78         5.63         1.26         41         5.22         1.19           78         2.90         1.25         41         3.56         1.29	N         X         SD         N         X         SD         N           78         3.47         1.48         41         3.22         1.67         119           78         5.63         1.26         41         5.22         1.19         119           78         2.90         1.25         41         3.56         1.29         119	N         X         SD         N         X         SD         N         X           78         3.47         1.48         41         3.22         1.67         119         3.39           78         5.63         1.26         41         5.22         1.19         119         5.49           78         2.90         1.25         41         3.56         1.29         119         3.13

A dependent t-test was used to analyse whether there was a significant difference between the subscale scores: the difference between scores for High Control and Low Control was not statistically significant. The score from the Medium Control Subscale was significantly higher than the High and Low Control. These findings indicate that participants markedly adopt the medium teacher control approach.

Comparisons using teachers' subscale scores revealed a statistically significant difference based on gender in the Low Control Subscale scores. This difference can be interpreted to mean that female teachers tend to have greater classroom control. Female teachers seem to restrict students' freedoms more than male teachers, for instance, in the case of participating in decisions and having preferences. However, scores obtained from subscales do not display any statistically significant differences based on school type, participants' marital status, their ages, occupational seniority and subject matter.

A significant relationship was observed between participants' control levels measured via the inventory and their self-declared control levels indicated by considering their existing practices. This finding can be interpreted to imply that participants are coherent in displaying their measured control levels in their actual practices.

# Discussion

This study aimed to compare disciplinary approaches of primary school teachers according to demographic variables such as gender, age, subject matter and school type. To a large extent, the majority of study participants adopted the Medium Teacher Control Approach. The average value (5.49) obtained in relation to this approach is close to average values (5.00) obtained in Bailey and Johnson's (1999) study and Onwuegbuzie's (2000) study (5.05). Notably, the average score of 3.39 obtained in the present study for the high teacher control approach is far below the average from these

two previous studies (4.82 and 4.73), and the average of 3.13 for the low teacher control approach is above their average values (2.18 and 2.23). According to these results, although the teacher-participants adopted the teacher controlled classroom approach, they also value students' classroom preferences, ensure their participation in decisions and grant them freedoms to express their feelings and opinions.

Compared to female teachers, male teachers come relatively closer to the low teacher control approach is an important finding. In Onwuegbuzie (2000) and Martin and Ying's (1999) studies, the average scores for the low level subscale do not contain any significant gender-related differences.

Another important finding is the relationship between teachers' approaches as measured via the inventory and their actual classroom management approaches. This suggests that teachers are coherent in their classroom management approaches and that they use the classroom management approach in which they believe, in their actual practice.

Teachers had the opportunity to assess themselves on the basis of their classroom management approaches during the in-service training organized by Cito Turkey. They could effectively compare their actual classroom management practices with the conceptual foundations of these approaches and assess their levels of coherence. The high degree of interest and curiosity observed amongst teachers during the BDI administration clearly demonstrated the need for self-awareness with respect to classroom management approaches. Therefore, the fact that teachers faced themselves was considered beneficial. It was ensured that none of the discussed classroom management approaches was highlighted as superior or inferior. Instead, a general consensus was achieved to the effect that different approaches bring strength to a school as long as they possess conceptual foundations and are coherently implemented.

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## Investigation of Preservice Teachers' Speech Anxiety with Different Points of View

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#### Abstract

The purpose of this study is to find out the level of speech anxiety of last year students at Education Faculties and the effects of speech anxiety. For this purpose, speech anxiety inventory was delivered to 540 pre-service teachers at 2013-2014 academic year using stratified sampling method. Relational screening model was used in the study. To explain the relationships among data in the study, frequency and percentage analysis, t-test, ANOVA, regression analysis and structural equation modelling were used. It is seen that preservice teachers have speech anxiety problems when they have to speak during their teaching activities, when they are demanded to speak all of a sudden, when their speech is interrupted, when they consider that they do not have different points of view and when they cannot balance their speech speed. Preservice teachers use their body language as they are giving speech, and they have less anxiety when they have eve-contact with their audiences, when are talking about themselves and when they are talking about the people they do not know. When preservice teachers' speech anxiety was investigated with regards to their departments, preservice English teachers and Turkish teachers were found to have higher levels of speech anxiety compared to preservice preschool teachers. When the findings obtained with this study were examined, it was found that, as presercice teachers' speech anxiety increases, their desire to participate in the activities also increase.

Keywords: Spaeking, speech anxiety, Pre-service Teachers.

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## Introduction

People use their speaking skills actively in their Daily lives so that they can express their thoughts and build verbal communication with other people. Speaking skill is involved in the use of both mental and psychological factors. As mental skills are closely related to thinking and questioning, psychological factors are closely related to anxiety. People are involved in interaction with other people and have opportunuties to express themselves with the help of speaking skill (Günes, 2013: 113). Speaking skill has many different definitions in the relevant literature. Speaking is defined as a mental, physical and physiological fact (Adalı, 1983); a linguistic and communicational activity (Özdemir, 1992: 22); individual's verbal expression of their emotion and thoughts (Kavcar, Oğuzkan and Sever, 1998: 57); expression of thoughts, emotions and knowledge through a language consisting of sounds (Demirel, 2003: 90); the action of expressing observations, emotion and knowledge with the use of langauge (Öz, 2005: 30); a communicational behaviour among people as a consequence of practical, cultural and aesthetic reasons (Taser, 2006: 35); a monument of thought which consists of paragraphs, sentences and words (Ünalan, 2006: 97); delivering an issue after carefully planning it in mind and helping others understand it (Kurudayıoğlu, 2003: 287); the attempt to help words and sentences gain life and liveliness (Senbay, 2006: 29). Speaking is a skill which sums up all the lifelong linguistic development in one's life, and it is closely related to people's linguistic development. Linguistic development is a personal skill and there has always been a directly proportional relationship between language development, life and environment (Demirel, 2003).

Speaking is a basic skill through which emotions and thought used at school, home and in social life are expressed, knowledge and experiences are shared (Öz, 2005: 30). Speaking is the most important interpersonal comunication and interaction tool. Speaking has four major qualities as physical, physiological, physcological and social. The physical quality of speaking is closely related to sound propagation in space. Physolocial quality of speaking consists of compatible working of speech organs. Phychological process of speaking is investigated by semantics. In semantics, our experiences over concepts are very important. In this process, the reactions related to external word come to the fore. Speaking also has a social quality. Individuals feel the need to build communication and socialize beginning from the moment when they are born. This leads them to socialising (Demirel, 2003: 90).

For a speech to be a good one, the speech should serve a specific purpose, should be based on sound knwoledge (İşcan, 2013; Özkırımlı,1994). A good speech has vocalization and fluency. The mimics and gestures of the speakers are also very important (Katrancı and Kuşdemir, 2015: 417; Özkırımlı,1994). The speech need to make listeners believe what is told; and it should also be based on sound knowledge. Speakers should use use some methods such as thinking, learning, affecting and discussion during the speech and they should also take the listeners' characteristics into consideration (Özkırımlı,1994). The vocabulary treasure of speakers is very improtant (Beyreli, Çetindağ and Celepoğlu, 2012: 143).

Teachers need to be a good model for their students. Teachers should prepare listening, speaking, writing and reading activities which will help students prepare for their future lives. (Calp, 2010: 205; Doğan, 2009: 191; Eryaman, 2008). In speech trainings, students' age, their family environments and where they live are very important (Arı, 2008: 155). Teachers build communication with their students through speaking skills (Riley, Burrel and McCallum, 2004). Not sufficiently developed speaking and listening skills negatively affect communication (Özbay, 2007: 99). Individuals, who cannot build healthy communication with other people, will have higher level of anxiety in this skill (Harb, Eng, Zaider and Heimberg, 2003).

Speaking skill is a special and important need for individuals to be able to successful in social life. When human life is considered to be very complex, individuals can make this complex life a meaningful one thanks to speaking skill (Göğüş, 1978: 174). As speaking is a skill which integrates individuals to the community, it is considered to be an important langauge skill which shapes human life (Lüle Mert, 2015: 784). Speaking is in the center of human life. Individuals transfer the knowledge that they gain through reading and listening skills to others using their speaking skills, and they build communication with others in this way. This communication process is very important in determining

their education and culture levels (Özbay, 2003: 6). Considering all these, we can suggest that the key element in a succesful communication is good speech (Kurudayıoğlu, 2003: 288; Sevim and Gedik, 2014: 381).

People have some anxieties in the community in which they live. The anxiety is experienced by one individual and the anxiety experienced seriously affects the environment (Özdal and Aral, 2005). Anxiety is defined as a shadowy fear (Morgan and Clifford 1998; Ünlü, 2001: 92); a disturbing emotional state which stimulates the sense of weakness against a danger (Aydın and Takkaç, 2007: 259); a state of excitement which apears with physical, emotional and mental changes in the case of stimulation (Sapir and Aranson, 1990); a state of shadowy fear (Kyosti, 1992; MacIntyre and Gardner, 1994; Morgan, 1998); an emotion that individuals are aware of and are not happy with (Üldas, 2005: 8). Anxiety, which is one of the most effective factors affecting the process of language learning (Bas, 2014: 101; Gardner and MacIntyre, 1993: 2; Horwitz, Horwitz and Cope, 1986), generally affects learning negatively (Yaman, 2010: 272). The studies which examine the effects of anxiety in language learning (Horwitz, Horwitz and Cope, 1991; Djigunovic, 2006; İscan, 2011; Tran, 2012; Yoğurtçu and Yoğurtçu, 2013) suggest that anxiety affects students' achievements and their performances in the classes. Burger (2006) defines anxiety as an unpleasant emotional experience leading to the feelings of distress, panic, fear and teror. There may be various causes of anxiety. Cüceloğlu (2000: 276-288) suggests that the causes of anxiety may be the possibility of negative consequences of an event, the possibility of punishment, the differences between what individuals believe and their behaviours and uncertainity about their future. The bahviours of the individuals experiencing anxiety and their life styles are degenerated (Tekindal, 2009: 9). Anxiety in language teaching appears as anxiety of writing, listening and speaking (Karakaya and Ülper, 2011; Melanlıoğlu, 2013; Sallabaş, 2012; Sevim, 2012). One of the biggest anxieties that human being suffers from is speech anxiety.

Speech anxiety can be defined as the anxiety of not being able to express yourself in public. The hearts of those experiencing speech anxieties beat quickly and they fear of not speaking in front of people (Bodie, 2010: 71). The individual experiencing speech anxiety may forget what to say in front of public, and s/he is afraid of making mistake. S/he thinks that everybody is looking for a chance to find her/his mistake as speaking, and s/he thinks that s/he will fail in the speech (Leibert and Morris, 1967; Katrancı and Kuşdemir, 2015: 418; Zeidner, 1998). The individuals suffering from speech anxiety are afraid of the cases which require speaking skills, they are afraid that their speech will be evaluated. Therefore, they avoid speaking and they feel bad as they are giving the speech (Melanlıoğlu and Demir, 2013: 393; Sevim and Gedik, 2014: 381; Yaman and Suroğlu Sofu, 2013: 43-44). For individuals not to suffer from such speech anxiety, they need to improve their speaking skills, and they need to make their speakings skills actively used ones. Teachers, schools and families play significant roles. The training which is provided by teachers beginnig from early ages will help students express themselve better and get rid of their speech related anxieties. Therefore, it is very important for teachers not to experience any anxiety problems as they are giving speech because they are models for students. This research aims to find out anxiety levels of last year students at Education Faculties because Education Faculties play significant roles in teacher training. For this purpose, preservice teachers fill in the speech anxiety inventory to deliver their views about this issue.

# Method

## **Research Model**

Relational screening model was used in the study. The research model which examines relations and connections in education is named as relational screening model (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz and Demirel, 2012: 23). Frequency and percentage analysis, t-test, ANOVA, regression analysis and structural equation modelling were used in the study to be able to explain the relationships among the collected data. Structural Equation Modelling (SEM) is a statistical method based on the causal and relational explanation of relations among observed and hidden variables. Before starting a statistical analysis, structural models should be created considering actual and possible relationships among variables. SEM is a statistical method which brings about a

hypothesis test approach to multiple variable analysis of structural theory. This structural theory reveals causal processes observed in many variables (Khine, 2013; Şimşek, 2007: 1). In this research, structural equation modelling was used to be able to build connnection between the thoughts of last year students about speech anxiety and variables.

# **Participants**

Stratified sampling method was used in the study and this method is one of the random sapling methods. Each sampling unit in this sampling method belongs to only one unit and the change within the unit is very limited (Büyüköztürk and etc., 2012: 86). 540 preservice teachers participated in the study from Çanakkale Onsekiz Mart UNiversity, Education Faculty in 2013-2014 academic year.

# Table 1

**Research Participants** 

	n	%	
Female	369	68,3	
Male	171	31,7	
Total	540	100,0	

When Table 1 is examined, it is seen that 68,3% of the participants are female, and 31,7% of the participants are male.

## Table 2

Departments of preservice teachers

Department	n	%
Turkish Language Teaching	126	23,3
Primary School teaching	97	18,0
Preschool teaching	89	16,5
English Language Teaching	88	16,3
Science	76	14,1
Computer	64	11,9
Total	540	100,0

When Table 2 is investigated, 23,3% of the preservices teachers were from Turkish Language Teaching Department, 18% of them were students of primary school teaching department, 16,5% of the students are from pre-school teaching department, 16,3% of them were students of English Language Teaching, 14,1% of them were students of science, 11,9% of them were students of computer teaching departments.

## **Data Collection Tools**

In the study, Speech Anxiety Inventory which was adopted into Turkish by Sevim (2002) was used. The KMO coefficient of the inventory was found to be .92 and the Barlett Test  $x^2$  value was found to be 2376,481 (p<.001). The scale used in the study is three factor. Cronbach alfa reliability coefficient which is the first factor was found to be .89, the second factor was found to be .82 and the third factor was found to be .87. The findings of these tests which were designed by the researcher suggest that KMO coefficient was found to be .95 and Barlett test  $x^2$  value was found to be 5561,362 (p<.001). Cronbach alpha coefficient of the scale was found to be .93. Considering the findings mentioned above, the scale was delivered to the preservice teachers.

## **Findings and Discussion**

In this part of the research, the data related to the speech anxiety of the participants will be analysed and discussed.

Table 2

The cases when preservice teachers suffer from the most speech anxiety

Items	X	S
4. The idea of giving a speech in a symposium, panel, conference and etc	2.93	1.16
makes me nervous.	_,	-,
13. I feel anxious when I am demanded to give a speech all of a sudden.	2,55	1,10
20. I feel anxious if I am interrupted when I am giving a speech	2,53	1,17
5. When I think that I connot handle my speech topic from different points of view, I feel anxious.	2,51	,99
8. I feel anxious when I cannot balance my speech speed.	2,46	,98

When Table 2 is examined, it is seen that preservice teachers suffer fromspeech anxiety when they think that they will speak in a symposium, panel, conference and etc ( $\overline{X}$ =2.93), when they are demanded to speak about an issue all of a sudden ( $\overline{X}$ =2.55), when they are interrupted as they are speaking ( $\overline{X}$ =2.53), when they think that they cannot handle the speech topic from different points of view ( $\overline{X}$ =2.51), when they cannot balance their speech speed ( $\overline{X}$ =2.46).

Table 3

The cases when preservice teachers have the least speech anxiety

Items	$\overline{X}$	S
1. I avoid using my body language as I am speaking	1,69	,83
2. I avoid building eye contact with my listener.	1,71	,86
14. I feel excited when I am speaking to someone from opposite sex.	2,02	1,03
19. I feel shy when I am telling about my personal issues.	2,08	1,00
16. I feel nervous when I am speaking to someone on the phone who I do not know much.	2,10	1,08

When Table 2 is investigated, preservice teachers have the least anxiety problem when they have to use their body language ( $\overline{X}$ =1.69), when they look at the eyes of their listeners ( $\overline{X}$ =1.71), when they are speaking to someone from opposite sex ( $\overline{X}$ =2.02), when they are telling about their personal issues ( $\overline{X}$ =2.08), when they are speaking to someone on the phoe who they do not know muck ( $\overline{X}$ =2.10).

## Table 4

t-test results of preservice teachers' speech anxiety depending on gender

Sub-dimensions	Gender	Ν	$\overline{\mathbf{X}}$	SS	sd	t	Р
	Female	369	1,67	,72	538	1,53	,125
Body language anxiety of speaker	Male	171	1,77	,76			
Speaker oriented anxiety	Female	369	2,41	,77	538	0,36	,719
	Male	171	2,43	,80			
Environment oriented anxiety	Female	369	2,26	,75	538	0,37	,707
	Male	171	2,23	,77			

When Table 4 is examined, it is seen that there is no statistically significant difference between speakers' body language anxiety ( $t_{(538)}$ = 1,53; p>.05); speaker oriented anxiety ( $t_{(538)}$ = 0,36; p>.05); environment oriented anxiety ( $t_{(538)}$ = 0,37; p>.05) and gender.
Table 5

Dimension	Source of variance	Total of square	sd	Averages of square	F	р	Significant difference
Speakers'	intergroup	2,008	5	,402	,74	,593	
body language	Within group	289,719	34	,543			
anxiety	Total	291,727	539				
Speaker oriented anxiety	intergroup	9,347	5	1,869	3,11	,009	Between A- C, it is in
	Wihin group	320,955	34	,601			F-C, it is in favour of
	Total	330,303	539				Г 
Environment oriented anxiety	intergroup	7,142	5	1,428	2,50	,029	Between A- C, it is in favour of $A$ : between
	Within group	304,430	34	,570			F-C, it is in favour of
	Total	311,572	539				Г

ANOVA results of preservice teachers' speaking anxiety depending on their department.

Note: A=Turkish Language Teaching; B=Primary School teaching; C=preschool teaching, D=science teaching, E=computer teaching, F=English Language Teaching.

When Table 5 is examined, it is seen that there is a significant difference between preservice teachers' speaker oriented anxiety (F=3,11; p>.05) and their departments. The results of the TUKEY test which was carried out to find out which groups are reponsible for the differences suggest that the preservice teachers studying at Turkish Language teaching and English Language Teaching departments were found to have more speaking anxiety than those studying at preschool teaching departments.

### Table 6

Multiple Regression analysis results related to preservice teachers' speaking anxiety

Variable	В	sd	β	t	р
Stable	,472	,072		6,573	,000,
Speaker's body language anxiety	,642	,031	,624	20,995	,000,
Environment oriented anxiety	,293	,032	,275	9,258	,000,

The multiple regression analysis results which was carried out to reveal to what extend preservice teachers' speaker body language anxiety and environment oriented anxiety affect preservice teachers' speaker oriented anxiety suggest that there is a statistically significant relationship between speaker oriented anxiety, speaker body language anxiety and environment oriented anxiety (R=0.775,  $R^2$ =0.601) (F<sub>(2-537)</sub>= 404.86, p<0.01). These two variables are responsible for 60% of the preservice teachers' speaker anxiety levels. The significance order of standardized regression analysis is that speaker's body language anxiety comes first ( $\beta$ =0.624) and environment oriented anxiety comes next ( $\beta$ =0.275).



Figure 1. Road sheme related to speech anxiety and social activities.

When the Figure 1 is exaamined, k1 explains the number of the books preservice teachers have read, k2 explains the case whether they have taken responsibilities as speakers or debator in front of any audience, k3 explains the case of attending any drama/theather activity, k4 explains if preservice teachers write any poem/novel/essay and etc. except for exams and assignments, k5 explains if preservice teachers worked somewhere to earn money.

When the findings were investigated, it was found that as preservice teachers' speech anxiety increases, participation in the activity also increases ( $\beta = .38$ , p< 0,001), and it was significantly affected. The variance which explains the direct effect of speech anxiety on activities was found to be 15%.

In this study, the following indexes were taken into consideration, such as Chi-Square Goodness, Goodness of Fit Index, GFI, Adjusted Goodness of Fit Index, AGFI, Comparative Fit Index, CFI, Normed Fit Index, NFI, Relative Fit Index, RFI and Root Mean Square Error of Approximation, RMSEA. In the analysis carried out in this study, Chi-Square Goodness was found to be  $\chi^2 = 24.701$  (sd = 19, p<0.01, Goodness of Fit Index, GFI =.98, Adjusted Goodness of Fit Index, AGFI =0.97, Comparative Fit Index, CFI =.99, Normed Fit Index, NFI =.96, Relative Fit Index, RFI =.95, SRMR, .033 and Root Mean Square Error of Approximation, RMSEA =.024.

In SEM, some values are taken as base to evaluate the fit and mismatch related to the subject model. In SEM, the most commonly used chi-square test ( $\chi^2$ )(Çokluk, Şekercioğlu ande Büyüköztürk, 2012: 267; Meydan and Şeşen, 2011:32), is accepted as starting fit value and it is commonly used (Barrett, 2007:816; Sümer, 2000:60). As  $\chi^2$  is sensitive to the size of the sampling, it is suggested to look at alternative evaluation criteria (Kline, 2011; Raykov, 2006; Sümer, 2000; Şimşek, 2007). In the cases when sd is big, as  $\chi^2$  tends to come up with meaningful results,  $\chi^2$ /sd rate is considered to be a criteria for adequacy (Sümer, 2000: 59). If this rate is  $\leq 3$  in large samplings, it is accepted as excellent (Kline, 2011:204; Sümer, 2000:59) and if it is  $\leq 5$ , it is fitting at average level (Sümer, 2000:59). Goodness of fit index (GFI) was developed as an alternative to  $\chi^2$  to be able to evaluate model fit independently from sampling size. It is a value between 0 and 1, and .90 and above means a possible good fit, .95 and above means excelent fit (Çokluk, Şekercioğlu and Büyüköztürk, 2012: 269; Sümer, 2000: 60). In GFI, NFI, RFI, CFI and IFI which take values between 0 and 1, if the value is closer to 1, the fit excellent (Çokluk, Şekercioğlu ve Büyüköztürk, 2012: 271-272; Sümer, 2000: 60-61). If RMSEA value is  $\leq$ .05, the fit is excellent (Kline, 2011: 206; Sümer, 2000: 61), if it is  $\leq$  .08, the

fit is good(Sümer, 2000: 61) and if it is  $\leq$  .10, the fit is weak or mediocre (Hoe, 2008:78). In SRMR, the fitting indicators are between 0 and 1 and if the value is equal to 0, the fit is excellent. In addition to that, if it is  $\leq$  .05, the fit is excellent, and if it is  $\leq$  .08, the fit is accepted to be good (Kline, 2011:209). When we consider that GFI, AGFI, RFI, NFI and CFI which are some of the fit index, need to be higher than .90, and RMSEA and SRMR need to be lower than .05, the fit index value demonstrate that the model is compatible.

### **Discussion, Results and Suggestion**

Speaking is the second skill which they acquire after the listening skill. Each individual starts to express themselves either writing or speaking in the public begining from their childhood. The environment, the family and school where children grow contribute a lot to individuals in their self expression. Any defect that they have at this period causes their failure in their self expression and this appears as a lack of skill to express themselves. Özbay (2005) suggests that speaking skill is innate, and this skill is improved during school life. Therefore, teachers have significant roles in individuals' effective speaking skill use and teachers are supposed not to have any speech anxiety. It is very important for teachers to speak their language fluently and accurately to be succesful in their profession and to be good models for their students (Katrancı, 2014: 175). With this regard, teachers' self confidence about their speaking skills, their feeling of competent for speaking, education faculties where they had relevant training and the courses that they took for improving their speaking skills are all important for teaching-learning process to achieve its goals (Katrancı, 2014: 178). Preservice teachers suggest that speaking skill is the most challanging skills that they have problem with improving (Ayan, Katrancı ve Melanlıoğlu, 2014). Achieving an effective and good speech, making it a habit are all closely related to the quality of the education provided at formal education institutions and the quality of the teachers teaching at these formal education institutions (Katrancı ve Melanlıoğlu, 2013: 653). The skill which has the most relationship with socialization is speaking skill out of all language skills. Therefore, improving speaking skill is directly related to psychology, sociopsychology, behavioural sciences and communication sciences (Ünalan, 2007: 2-3). The study carried out by Durukan and Maden (2010) suggests that Turkish language teachers have low level of communication skills and that female Turkish language teachers are significantly better at speaking skills compared to female colleaques when gender is considered. There has been a positive, weak and insignificant relationship between teachers' communication with students and speaking skills (Vatansever Bayraktar, 2012: 174).

According to the study carried out by Akkaya'nın (2012), the problems that preservice teachers have are not focusing on the speech, hesitation in speech, violating relevant grammar rules, lack of knowledge, the problems arising from social obstacles and physical reasons, psycological problems (not being able to speak in from of public, not being able to speak in peer to peer relationships), sound, tone, stress, pronunciation mistakes. When the study carried out by Arslan (2012) was investigated, the students studying at university claim that the problems that they suffer from in related to not using speaking skills effectively result from the courses that they took at university. The crowded classes, not giving students enough chances to speak in the classroom, abstaining from the reactions of the lecturers, exam system related problems are all suggested as the causes of their failure in improving their speaking skills. In a study carried out by Sevim and Varişoğlu (2012), it was found that preservice teachers had problems with acquiring speaking skills and expressing themselves. When the study was examined, it was found that preservice teachers had the following speech related problems; diction defect, ineffective speech, speaking with a local dialect, incohenecy, insufficient vocabulary treasure, not using body language effectively, speech anxiety, lack of self confidence and using borrowed words from other languages.

Katranci and Kuşdemir (2015) carried out an experimental practice to reduce preservice teachers' speech anxiety. The analysis carried out following the end of the implementation suggests that preservice teachers were found to have gained competency and to have decreased their speech anxiety levels.

The study found out that female students had lower level of anxiety levels compared to male students. Besides, preschool education department students were found to have the lowest anxiety level.

When education faculties were investigated, it was found that Turkish Language teaching and Foreign language Teaching department students were found to have highest skills to express themselves. In a study carried out by Temiz (2013), students from Turkish Language teaching department had higher speech anxiety levels compared to music department. The study carried out by Başaran and Erdem (2009) suggests that receiving unversity education has contributed a lot to students' speaking skills from Turkish, Music and Primary school teaching department, but the course "verbal lecture" taken at university failed improving students' speaking skills adequately. Preservice teachers need to ask for more opportunuties to speak and to express themselves at universities. Aykaç and Çetinkaya (2013) suggested in their study that creative drama activities improved preservice teachers' speaking skills. Katrancı and Kuşdemir (2015) suggest that "school experience" and "teaching practice" courses they take at the last year, are good opportunuties for preservice teachers to improve their verbal lecture skills and to reduce their speech anxiety levels.

Küçükosmanoğlu (2015) has suggested that last year students were found to have less speech anxiety levels compared to other classes. Similarly, Çakmak and Hevedanlı (2005) have found that university students' speech anxiety levels significantly change depending on the variable of class. The studies carried out in the field reveal that students' anxiety levels change according to their classes and their anxiety levels were found to have decreased towards last year (Bozkurt, 2004).

Speaking skill is improved with rules and training. The best age for students to adapt rules is generally primary school period. Therefore, primary school teachers have very important responsibilities (Kuru, 2013: 187). Individuals need to have a rich vocabulary treasure and field knowledge to be able to speak effectively (Doğan, 2009). Besides, reading and reporting activities should be given more importance in speaking trainings (Özbay, 2005). Kurudayıoğlu (2003) and Özbay (2005) suggest that students can better express themselves thanks to unprepared speeches. The dialoques that students build with peers help students improve themselves in the field of speaking. Teachers need to be good models for students in this process (Uçgun, 2007). Practices at every stage of education fall short in achieving the goals of speaking training. If relevant practices could be done most effectively, students could be more succesful at expressing themselves, participating in social activities, expressing their opinions in an organized way and improving their self confidence (Temizyürek, 2007).

When preservice teachers will have to speak in their teaching practices, it was found that they had speech anxiety problems when they are demanded to speak all of a sudden, when they are interrupted, when they think that they cannot have different points of view, when they cannot balance their speech speed. Preservice teachers had less anxiety problem when they use their body language as they are giving speech, when they had eye contact with their listeners, when they are talking about themselves and when they are speaking to someone who they do not know. The study did not come up with any findings suggesting that there is a significant relationship between the genders of preservice teachers and their anxiety levels. When preservice teachers' anxiety levels were investigated with regards to their departments, Turkish language teaching department and English language teaching department students were found to have more speech anxiety problems than preschool teaching department students. The reason for this anxiety may be that they have conditioned themselves for being better as they are students at Language teaching departments. When the obtained findings were investigated, it was found that as preservice teachers' anxiety levels increase, their desire to participate in teaching activities also increases. It can be suggested here that preservice teachers try to overcome their anxiety problems by participating in more teaching activities. Preservice teachers are supposed to make themselves fully competent at their university education, which is the last step of their education life. Preservice teachers should develop themselves reading more, and participate in group discussions and scientific activities effectively. A teacher suffering from speech anxiety cannot give a good education of how to speak. Therefore, more importance should be given to preservice teachers' skill education at universities; both theoretical and practical trainings need to be given to preservice

teachers to help them gain superior skills such as critical thinking, creative thinking, researching, questioning.

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# Investigation of the Motivation Level of Teachers Working at State Schools in Relation to Some Variables

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### Abstract

In order to give the best and accurate orientation to teachers working in school organizations, it seems to be necessary to determine their motivation level. Thus, the purpose of the current study is to determine the motivation level of teachers working in state elementary and secondary schools. Moreover, the study also looks at the relationships between motivation level of teachers and type of the school, the number students in the class, length of service and job satisfaction. The universe of the present study conducted according to descriptive survey model consists of 1310 teachers working in 76 elementary and secondary schools in Mentese district of the city of Muğla and the sampling is comprised of 398 teachers randomly selected from among the universe. The data collection instrument of the study has two parts, personal information form and teacher motivation scale. In order to determine the factors motivating teachers, "Teacher Motivation Scale" was developed on the basis of "Workers' Job Satisfaction Evaluation Scale" developed by Gülten İncir (1990), a literature review and expert opinions The Cronbach Alpha reliability coefficient of the scale was found to be 0.834. The findings of the study revealed that the motivation level of the teachers working at state schools is high in general. It was also found that the teachers' motivation levels do not vary significantly depending on type of the school, the number of students in the class and length of service but vary significantly according to job satisfaction.

Keywords: teacher, motivation, school, state school

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#### Introduction

Today, one of the important prerequisites of being a developed society is effective execution of educational and instructional activities. The most influential factor determining the efficiency of these educational and instructional activities is the teacher. The teacher is the person who holds a great potential in the determination of the future of a society. It is known that the teacher's power to influence the student and educational programs is greater than that of the other elements involved in education (Erdem, 1998). Thus, teacher education and their qualifications are of great importance. Therefore, teachers should strive for personal development and gain the identity of a professional teacher (Azar and Çepni, 1999; Güzel, 2011).

Today, success of any organization is closely associated with the motivation of its workers (Yiğenoğlu, 2007; Sonmezer & Eryaman, 2008). Educational organizations are not an exception and there is much research focusing on the motivation of teachers (Can, 2015; Mansfield and Beltman, 2014; Özen, 2014; Güçlü, Recepoğlu and Kılınç, 2014; Lourmpas and Dakopoulou, 2014; Recepoğlu, 2014; Satman, 2013; Öztürk and Uzunkol, 2013; Yalçın and Korkmaz, 2013; Ada et al., 2013; Sharabyan, 2011; Güzel, 2011). The word of motivation comes from the Latin word "Moti" meaning "to move". Motivation is an affective factor directing and reinforcing human behaviors to reduce a drive or to achieve a goal (Wright and Wiediger, 2007; Yılmaz and Huyugüzel Çavaş, 2007). In the field of psychology, conscious and unconscious elements initiating a behavior, making it understandable, explaining , sustaining and directing it are called motives. The process of the formation of a behavior as a result of motives is called "motivation" (Köknel, 1983). Similar definition is offered by Türk Dil Kurumu Sözlüğü (2000) as "motivation is making eager, encouraging and getting into action" (Açıksöz, 2008).

Motivation is a state of reinforcement having physiological, cognitive and affective dimensions and putting an individual into action for a specific purpose, making the individual more willing to perform a task and increasing the will of working, giving energy and direction and directly affecting the performance of workers (Jonett, 2009; Özdemir and Muradova, 2008; Ofoegbu, 2004; Başaran, 1991). Motivation involves all internal and external stimuli, desires and wishes promoting people to move, giving directions to their behaviors, affecting, checking, reinforcing human behaviors by means of their thoughts, hopes, beliefs, needs and fears (Örücü and Kambur, 2008; Güzel, 2011).

Depending on the data collected from various organizations, two types of motivational sources were determined for educational organizations as intrinsic and extrinsic. Intrinsic motivation comes from the desire of feeling adequate and independent and meeting higher level needs (Onaran, 1981). Intrinsic motivation is shaped parallel to an individual's own interest, curiosity about a task and satisfaction derived from accomplishing the task. Enthusiasm, pleasure and desire are important intrinsic motivators for an individual to perform a task. When the teacher puts the greatest emphasis on the job satisfaction while performing an activity within the educational organization, it means he/she is intrinsically motivated (Güçlü, Recepoğlu and Kılınç, 2014; Millette and Gagne, 2008; Lin, 2007). On the other hand, extrinsic motivation comes into being as a result of external stimuli and task itself is not the focus of attention (Akbaba, 2006). Here, the stimulus arousing the motivation of an individual are all examples of the sources of extrinsic motivation (Littlejohn, 2008). School organizations need teachers to accomplish their objectives and they employ material motives for their teachers to achieve organizational objectives. For an individual to be intrinsically motivated, some of his/her basic needs must have already been met (Yıldırım, 2007).

Success of an organization is closely associated with the motivation of the workers of this organization (Yiğenoğlu, 2007). Thus, great deal of research has focused on how to motivate teachers at schools that are the smallest unit of educational organizations. Improved motivation will increase the efficiency of the teacher and accordingly the efficiency of the student. Thus, it will be easier for educational organizations to achieve their goals.

There are many factors affecting the intrinsic and extrinsic motivation of teachers working in school organizations included within the education system. Factors such as physical conditions of the school, job satisfaction, type of control imposed, wages, interpersonal relations, pleasure taken from the job determine whether the motivation will be low or high (Ada et al., 2013; Yalçın and Korkmaz, 2013; Güzel, 2011; Dereli and Acat, 2010). Thus, the purpose of the current study was set to be to determine the motivation level of elementary and secondary school teachers. In this regard, the current study seeks answers to the following questions.

- 1) What is the motivation level of elementary and secondary school teachers?
- 2) Does the motivation level of the elementary and secondary school teachers' motivation level vary significantly depending on type of the school, the number of students in the class, length of service and job satisfaction?

### Method

The present study employed the survey method. Survey studies are used to determine the existing situation. As there are comparisons made in relation to type of the school, the number of students in the class, length of service and job satisfaction, sectioning approach is adopted and as it is intended to determine the relationships between the continuous variables, relational screening approach is adopted (Çepni, 2010).

### **Universe and Sampling**

The universe of the present study consists of 1310 teachers working in 76 elementary and secondary schools in Menteşe district of the city of Muğla and the sampling is comprised of 398 teachers randomly selected from among the universe. Demographic characteristics of the teachers in the sampling are as follows: 47.7% (n=190) of the teachers are males, 52.3% (n=208) are females; 5.5% (n=22) are in the age group of 21-30, 38.2% (n=152) are in the age group of 31-40, 39.7% (n=158) are in the age group of 41-50, 16.6% (n=66) are in the age group of 51 and over; 89.7% (n=357) are married, 10.3% (n=41) are single; 10.1% (n=40) hold an associate degree, 80.2% (n=319) hold a bachelor's degree, 9.8% (n=39) hold a post-graduate degree.

## **Data Collection Instrument**

In the study, "The Questionnaire of Factors Motivating Teachers" was employed to collect data. The questionnaire is comprised of two parts. First part aims to elicit demographic features of the teachers and the second part is the teacher motivation scale. In the first part of the questionnaire, there are some items to elicit some demographic features of the teachers (type of the school worked, the number of students in the class, length of service and job satisfaction).

In the second part of the questionnaire, there is "The Teacher Motivation Scale" to determine the factors motivating the teachers. This scale was developed on the basis of "Workers' Job Satisfaction Evaluation Scale" developed by İncir (1990), a literature review and expert opinions. The Cronbach Alpha reliability coefficient of the scale was found to be .834. This value shows that the scale has a reliable structure.

### Findings

In order to find an answer to the first research question, means and standard deviations related to the teachers' motivation levels are presented in Table 1.

	N	The	lowest	The highest score	Mean	S
Teachers'		score				
motivation		55		149	124.14	11.16
levels	398	Low		Medium	High	Very high
		2		17	360	19

**Table 1.** Distribution of the Teachers' Motivation Levels

The teachers' mean score for the attitudes towards motivational factors is 124.14, standard deviation is 11.16. These values reveal that the teachers' attitudes towards motivational factors are ahigh. This finding shows that in general the teachers are affected from motivational factors.

In order to find an answer to the second research question of the study, the results of the oneway variance analysis (ANOVA) conducted to elicit the relationships between the motivation level and type of the school worked, the number of students in the class, length of service and job satisfaction are presented in Tables 2, 3, 4, and 5.

**Table 2.** The Results of One-way Variance Analysis (ANOVA) Conducted to Determine whether the Teachers' Motivation Level Varies Significantly depending on Type of the School Worked

Variable				N	Mean		Sd
	(1) Elementary			125	123.56		11.85
	(2) Secondary			110	125.86		8.81
	(3) High school			162	123.43		11.94
Type of School	Variance Source	MS	df	SS	F	р	Difference Scheffe
Type of Beneer	Between	448.85	2	224.42	1.80	.16	
	Groups						
	Intra	48877.38	394	124.05			-
	Groups						
	Total	49326.23	396				

As can be seen in Table 2, one-way variance analysis conducted to determine whether the teachers' motivation level varies significantly depending on type of the school revealed that the difference between the arithmetic means of the groups is not significant (F=1.80; p>.05).

Table 3. The Results of One-way Variance Analysis	(ANOVA) Co	onducted to Deterr	nine whethe	r the
Teachers' Motivation Level Varies Significantly dependent	nding on the l	Number of Students	s in the Class	5
Variable	Ν	Mean	Sd	

Variable				N	Mean	Sd
	(1)			34	124.35	8.24
	(2)			163	123.64	12.88
	(3)			174	124.02	9.93
	(4)			26	127.88	10.43
The number of students in the	Variance Source	MS	df	SS	F p	Difference Scheffe
class	Between Groups	408.54	3	136.18	1.09 .35	
	Intra	48917.68	393	124.47		-
	Groups					
	Total	49326.23	396			

As can be seen in Table 3, one-way variance analysis conducted to determine whether the teachers' motivation level varies significantly depending on the number of students in the class

revealed that the difference between the arithmetic means of the groups is not significant (F=1.09;p>.05).

Variable				N	Mean		Sd
	(1)			17	127.11		8.60
	(2)			51	126.72		10.21
	(3)			100	122.95		12.18
	(4)			229	123.87		10.99
Length of Service	Variance Source	MS	df	SS	F	р	Difference Scheffe
	Between Groups	648.98	3	216.32	1.74	.15	
	Intra Groups	48677.24	393	123.86	_		-
	Total	49326.23	396		-		

**Table 4.** The Results of One-way Variance Analysis (ANOVA) Conducted to Determine whether the Teachers' Motivation Level Varies Significantly depending on Length of Service

As can be seen in Table 4, one-way variance analysis conducted to determine whether the teachers' motivation level varies significantly depending on the length of service revealed that the difference between the arithmetic means of the groups is not significant (F=1.74;p>.05).

**Table 5.** The Results of One-way Variance Analysis (ANOVA) Conducted to Determine whether the Teachers' Motivation Level Varies Significantly depending on Job Satisfaction

Variable				Ν	Mean		Sd
	(1) Satisfied			300	123.46		11.76
	(2) Dissatisfie	d		48	125.54		9.03
	(3) Undecided			49	126.97		8.52
Job satisfaction	Variance Source	MS	df	SS	F	р	Difference Scheffe
300 suisjueiton	Between Groups	626.73	2	313.36	2.53	.04	
	Intra Groups	48699.49	394	123.60			3>1
	Total	49326.23	396				

As can be seen in Table 4, one-way variance analysis conducted to determine whether the teachers' motivation level varies significantly depending on job satisfaction revealed that the difference between the arithmetic means of the groups is significant (F=2.53;p<.05). Following this finding, complementary analyses (posthoc) were conducted to determine the source of the difference. First, the homogeneity of the variance was checked and it was decided that the variances are homogenous ( $L_f$ = 3.98;p>,05); thus, Scheffe test was preferred. The reason for selecting Scheffe analysis is that this analysis is sensitive towards  $\alpha$  type error. The results of Scheffe analysis conducted to determine the source of the difference revealed that the difference is between the mean scores of the undecided group and the satisfied group in favor of the satisfied group ( p<.05). The difference between the arithmetic means of the other groups was not found to be significant (p>.05).

#### Discussion

The mean score for the teachers' attitudes towards motivational factors was calculated to be 124.14. The teachers' motivation level was found to be high in general. This shows that the teachers are affected from motivational factors to a great extent while working at school to fulfill educational

objectives. In order to improve the motivation of teachers working at elementary and secondary education organizations, the factors increasing the motivation of teachers should be supported and the factors decreasing their motivation need to be reduced. In this regard, the factors intrinsically motivating teachers should be given the highest priority. As a result of improved intrinsic motivation, teachers will be more willing, successful and active to participate in the process. Enhancing the intrinsic motivation of teachers is the responsibility of school administration to a great extent. Therefore, school directors need to be sensitive towards the needs of teachers, fulfill their desires, put emphasis on factors positively affecting teachers' motivation and support them. The findings of the current study concur with the findings reported by Can (2015), Erdem and Gözel (2014) and Ada et al. (2013).

It was found that type of the school worked does not have a significant effect on the teachers' attitudes towards motivational factors [p>.05]. Thus, it can be claimed that the factors motivating teachers are not affected from type of the school. While this finding is supported by the finding reported by Güzel, Özdöl and Oral (2010), it is contrary to the finding of Gökay and Özdemir (2010).

It was also found that the teachers' attitudes towards motivational factors do not significantly vary depending on the number of students in the class [p>.05]. Thus, it can be argued that the motivation level of the teachers is not significantly related to the number of students in the class. This finding is also supported by the finding reported by Gökay and Özdemir (2010). Moreover, it was found that the teachers' attitudes towards motivational factors do not vary significantly depending on length of service [p>.05]. Thus, it can be claimed that the teachers' length of service does not significantly affect their attitudes towards motivational factors. This finding is parallel to the finding reported by Güzel (2011) and Çermik (2001).

Finally, it was found that the teachers' attitudes towards motivational factors vary significantly depending on their job satisfaction [p<.05]. In this regard, length of service can be claimed to be influential on the teachers' attitudes towards motivational factors and this difference is between the undecided group and the satisfied group in favor of the satisfied group.

### **Results and Suggestions**

In light of the findings of the study, it can be claimed that the teachers' attitudes towards motivational factors are high. It was also concluded that type of the school, the number of students in the class and length of service are not influential on the teachers' attitudes towards motivational factors. It was also found that the teachers who are in the undecided group are affected more from motivational factors. Thus, the following suggestions are made:

- More emphasis should be put on factors intrinsically motivating teachers.
- School directors should pay greater attention to teachers whose motivation level is undecided.

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### **Hierarchical Classification of Values**

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#### Abstract

Values are of utmost importance for the creation, development and sustainability of a life worthy of human dignity. However, because even superficial views of values are regarded as values themselves, they have become relative and become degenerated; therefore, they have lost the properties – potentials and powers – essential to human dignity. This means that values have turned into subjective options and ideals that are no longer binding to personal, social and international relations. Restoring values' righteous potential for the establishment of a humanistic life is possible only by enriching our personal perceptions and judgement with social and even universal values and revealing the hierarchical relations among them. All values are integral parts of a qualitative hierarchy of interrelated values. The primary concern of this study is to fill a niche in the literature by revealing this hierarchical interrelation and building a model to enable analysis of these values in terms of their instrumental or terminal functions, characteristics and scopes. For the purpose of the study, a new theoretical discussion on the hierarchical structure of values is introduced in consideration of their patterns and interrelations through a conceptual analysis of the values. This research is an analytical study based on a comprehensive literature review.

Keywords: Values, value education, hierarchy of values, classification of values

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### Introduction

Most of the experts including the UNESCO instructors are in consensus that values education one of the major problems of societies is. (Delors, 1996; Wynne & Ryan, 1996). It is a *sine qua non* for an internationally acceptable value education to arouse an internationally acceptable value perception and judgement. Therefore, an effort to answer three questions would lay the groundwork for an axiological discussion: Are values subjective or objective? Do values change? Do values have a hierarchy? However, because the literature has not yet to produce an internationally acceptable perception about values and their hierarchy and instead treats values as cultural and subjective judgements, which are incapable of producing supranational global perceptions and judgements (Bengston, 1975; Luhmann, 1984). To do so, it is necessary to reveal that values have supra-individual and supra-national components. For this study, the literature in Turkish, German and English was reviewed, and perceptions, judgments and classifications concerning values were investigated. The study is limited to sources in these three languages. It has been discovered that values are discussed mostly as relative and non-functional ideals.

The study begins with the definition, function and significance of the value concept in order to eliminate such degenerated conceptualizations and to strengthen these perceptions and judgments. Then, debated properties of the analyses in the literature on value theories, values and value judgments are discussed. Lastly, after a description of prevailing value classifications, a new theory of the structure of values is introduced in the form of a hierarchical model.

#### **Concept and Definition of Value**

*Değer* in Turkish originates from *değmek* (to be worthy of), while it means "value, expense, gem/jewel" in Ottoman Turkish (Hançerlioğlu, 1976, p. 275). In English, *value* is derived from *valere* in Latin, which means "to be of value" or "to be strong" (Atay, 2003; Bilgin, 1995; Özensel, 2003; Rokeach, 1973). Values are among the basic and ancient topics of philosophy; W. Windelband defines philosophy as "a science of values" (Özensel, 2003, p. 218). Therefore, "value" in philosophy appears as an issue of "valuing" and "values" because such questions as "what is good?," "what is beautiful?," "what is useful?," "which value to teach/instill?" mean that value has been problematized and analyzed by many thinkers (Kuçuradi, 1971; Noll, 1997).

The concept of value in the social sciences was first used by Znaniecki in 1918 (Rokeach, 1973; Yılmaz, 2006, p. 50). Values are yardsticks for the description, evaluation and judgment of individuals' thoughts and actions. These permanent judgments and criteria are internalized as a result of an individual's interaction with the environment and during the socialization process. Actions are generalized behavioral principles accepted as "the best, the most appropriate and the most useful" practices by society (Turgut, 2010, p. 3). Some definitions of values as such are available in the literature. For Aristotle, values are the criteria, principles of knowing what is right, and thinking, evaluating and acting in the correct way (Kuçuradi, 1999). According to Kluckhohn, "a value is a concept, explicit or implicit, distinctive of an individual or characteristic of a group of the desirable which influences the selection from available modes, means and ends of action" (Kluckhohn, 1951, p. 395; 1962). Rokeach (1973) defines values as a set of internalized principles and rules supporting the beliefs and attitudes of an individual, governing his choices, and playing a decisive role in his basic individual tendencies. From this viewpoint, values serve as standards or criteria to guide such social behaviors as comparison of "the self" - primarily action, attitude, ideology, moral judgment, rationalization, and argument - with others, representation of "the self," and affecting others. Therefore, as principles and beliefs associated with ideal behaviors and ultimate state, values affect humans by means of conscious and unconscious acts (Rokeach, 1973; 1976, pp. 124-125, p. 162).

Schwartz defines values as conceptions of the desirable that guide the way in which social actors select actions, evaluate people and events, and explain their actions and evaluations and that are trans-situational criteria or goals, ordered by importance as guiding principles in life (Schwartz, 1999,

## International Journal of Progressive Education, Volume 11 Number 3, 2015 © 2015 INASED

pp. 24-25). For Allport, "a value is a belief upon which man acts by preferences" (cited by Herriot, 1976, p. 18). Hofstede defines values as principles determining the attitudes and preferences (Hofstede, 1991, p. 18; Özen, 1996, p. 12) Williams defines values as preference criteria or standards (Kilby, 1993, s. 33), and Fichter as criteria attaching meaning and importance to culture and society (Fichter, 2011). For Boltin and Bolsinger, values are above all based on people's preferences and priorities regarding possible goals and behaviors of individuals and related groups (Boltin & Bolsinger, 2010). V.E. Frankl, a neurologist and the founder of logotherapy describes value as a sense of possibilities that can be innate, enforced and modified (Boltin & Bolsinger, 2010). W. Kurz describes a value as what men are offered for the conservation, development and fulfilment of life. His view is that people realize these values through value-oriented actions, both for themselves and others by means of participation (Boltin & Bolsinger, 2010). Güngör defines value as "the belief that something is desirable or undesirable" (Güngör, 2000, p. 27). Value is a higher and useful quality considered to be spiritually, socially, morally, and aesthetically possessed by a being (Oğuzkan, 1993). Values are important yardsticks of attitudes, ideologies, moral judgments and behaviors (İmamoğlu, Karakitapoğlu & Aygün, 1999, p. 2). Ünal defines values as general goals observed and accepted by a community and therefore values can be regarded as generalized motivators based on basic human drives and shared by the members of a society (Ünal, 1981, p. 18).

From an individualistic viewpoint, values that can be defined as permanent judgments and criteria which individuals have internalized through interaction with peripheral elements and which guide their actions, but also socially as generalized behavioral principles accepted to be the best, the most appropriate and useful by society (Kaymakcan, 2008). Similarly, for Özgüven values are persistent motivators that establish the basis of individuals' attitudes and that force individuals to reach certain goals and to make certain choices (Özgüven, 2000, p. 36). Especially, in consideration of the classical definition of Kluckhohn (1962), value refers to all mindsets, mental patterns related to qualities and judgments worthy of thriving to achieve.

In light of all these definitions, it can be suggested that values are influential in understanding human behavior (England & Koike, 1970). Thus, it can be asserted that values are the most valid benchmarks and explanations of attitudes and behaviors (Güvenç, 1976). They are the essential components of human mental patterns. For someone to be well-balanced and peaceful, a high level of conformity among these components is required. Therefore, any dispute should be immediately resolved to ensure the sustainability of the maintain social welfare and peace (Güngör, 1993).

Rokeach (1976) remarks that "an individual incorporates tens or hundreds of thousands of beliefs, thousands of attitudes, but only dozens of values. Importance of each of these values depends on individuals, and might be of low or high importance" (denoting a hierarchical structure). This structure is comprised of instrumental and terminal values (Rokeach, 1976, pp. 124-125, p. 162). Although Rokeach's holistic model has several advantages and has been adopted by many researchers, it has been criticized by Luhmann (1984) and Bengston (1975) for being only partially persuasive (Albert, 2008).

### **Characteristics and Functions of Values**

Humans, as the only being to aspire to a meaningful life, are unique for having a bicomponential nature: the mechanical (biological) and the transcendental characteristics, which is the "being" (Tozlu, 1992). While all organisms depend on their physical-natural environment to survive, only human can turn this environment into a spiritual setting of meaningful components and can transcend the natural and physical environment. As a being with a reasoning capability, man's constructive attributions manifest themselves in intellectual theoretical activities (Gündoğan, 2013). Man has to learn how to balance these two complementary components in an appropriate. Therefore, man must "know." Knowledge is not absolute; when knowledge is at stake, its validity and reliability, inaccuracy, and accuracy should be discussed. The incorporation of knowledge into life requires it to be tested and investigated. In this process of evaluation, "value" comes in. Any knowledge that has not

been subjected to such an evaluation which has no relation to life itself, and thus cannot exist (Erdemli, 2003; Tozlu, 1992).

In conclusion, human acts are not merely simple moves or behaviors, but tangible reflections of intention. Therefore, the purpose of an act can be understood only with the discovery of the intention. Because the purpose of behavior is to put a value into action, the significance of an act can be measured in terms of its appropriateness to the desired value (Gündoğan, 2013). In this sense, no behavior has a goal but no purpose. All behaviors of men are directly or indirectly guided by values, defined as principles/criteria underlying, guiding and governing all actions of men (Uysal, 2003, p. 52). Thus no act can exist without a purpose/intention, and there cannot be a purpose and an intention unrelated to values. Thus, anyone thinking either about humans and their personality or about education must answer questions about the purpose and criteria to adopt. In other words, people have to know what values govern their conceptions about others, about their own attitudes and behaviors, and by what ideals they should raise their children. Values are personal structures that guide an individual's goals, principles and behavioral priorities and are vital his or her happiness, peace, consistency and quality of life (Renner, 2003). Values governing an individual's life are the fundamental principles underlying his or her actions, particularly decision-making, problem-solving, communication, motivation, and sustainability of personal development. Values profoundly influence our lives. They are the part of the very reality that each of us experience daily. They help supply meaning of existence (Kilby, 1993; Özensel, 2003). In this sense, values allow us to reach beyond the objective reality. Thanks to our values, our thoughts transcend physical reality (Tozlu, 1992).

Values have a remarkable place in social life. According to Toku (2002), values make social life possible because they are shared by members of a society. This proposition alludes to the objectivity of values (Toku, 2002). Values as socio-cultural aspects are the general criteria and standards of basic, selective, conscious and purposeful behaviors, and serve as a yardstick for the acceptability of an individual's desires. Value judgments are influential in and shaped by social life and culture (Gökçe, 1994). The effects of values on cultures and of cultures on values in return signify a complicated interrelation and interaction. From this perspective, analyzing the values of individual's priorities, beliefs, attitudes, behaviors and personal desirables and undesirables can affect his or her personality, understanding the value systems of a culture is possible by understanding that culture's characteristics (Roy, 2003, pp. 1-2). In other words, individuals, societies, and cultures can be described through their value systems (Kuşdil & Kağıtçıbaşı, 2000).

Values as factors guiding us to choose some from among a large variety of possible behaviors are subjective reactions facilitating and governing the individual's relations to the world outside. These values shaped by individual, environment and emotions facilitate peaceful coexistence (Zeylan, 2007, pp. 1-2). An attitude as the building block of socio-psychology is "a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (Allport, 1935; cited from Freedman, Sears & Carlsmith, 1993).

An attitude is as a longitudinal behavior and evaluation tendency. It has at least an affective and a cognitive factor towards a thing, phenomenon or human (Bohner, 2003, p. 267; Fröhlich, 1993, p. 132; Giner-Sorolla, 1999, pp. 442-443). Values underlie attitudes. Values are the determinants of attitudes, thus because values are the source and determinants of attitudes in the formation of cognitive system and personality of an individual, values precede attitudes (Rokeach, 1973). Attitudes refer to actions, emotions and thoughts deriving from values (Sweeney *et al.*, 1999) and values influence attitudes, which guide and affect behaviors. For Rokeach (1973), values are enduring facts that are related to beliefs, choices, individual and social understanding. They are yardsticks for decisions and behaviors (Rokeach, 1973, pp. 5-10). Values influence the formation of thoughts, judgments and attitudes and shape our tendencies and propensities. Therefore, they are inescapable and individuals do not choose values; values claim individuals (Everard, 1995, p. 131).

Feather sums up the characteristics of values as follows/ Values are generalizations in relation to expected, desired behaviors and goals, and incorporate necessities along with such characteristics as "good" and "bad." Values are general beliefs about expected social behaviors and goals that include the dimensions of good and evil and unlike individuals' desires and needs, implement a moral necessity. They are determinants and benchmarks of evaluation of behaviors, justification and substantiation of opinions, planning and management of actions, selection of one option over the others, introduction of the "self" to others and social influence. Values are hierarchically ordered. Their importance is subject to modification in the course of a lifetime. Value systems vary from person to person, from group to group and from culture to culture (Feather, 1986, 1988; Hogg & Vaughan 1998). Functions of values are beyond the scope of this study.

### **Education and Values**

Despite the proliferation of the definitions of education, only a few very influential ones are considered here. For example, Yıldırım (1999) defines education as an organized interaction required for personal development through the inculcation of significant personal qualities such as knowledge, skills, understanding, attitudes, and traits. According to Bilhan, education is the realization of individual's methods and techniques to reveal his or her own value sources so as to develop his or her physical, spiritual, mental, social and moral features (Bilhan, 1986, p. 14). Simply put, education helps individuals acquire a personality and identity. By education, "it is important to help a child think conscientiously, assume the responsibility of his or her behavior, have a strong will, and be happy, well-balanced and well-respected" (Atmaca, 2007, p. 150). From this viewpoint, education "is the process of guidance to train enlightened characters and capable/mature individuals who live in a reflective and responsible manner, think independently and critically and act accordingly, consider social and rational values when making decisions, confront existentialistic questions, resolve vital problems, and possess and manage a mental, emotional, conscious and behavioral integrity" (Ergen, 2013, p. 177).

Education denotes the highest level of humanistic learning and a learning process reduced to techniques learning are different from each other.

A high level of humanistic learning is a conscious and reflective learning process, and enhances the thinking capacity. It is a free and liberal learning type that helps individuals gain a learning skill in an individual, autonomous, and responsible way. It is holistic and arouses a temporal consciousness of past, present and future. It is value- and character-based, develops personality, and helps people acquire a characteristic nature of their own. (Ergen, 2013, p. 177).

The modern world has almost completely changed the perception of time and space. People who had a local thinking perspective and perception 100 years ago can think on a global scale now. Humans, previously just aware of the history and period they live in need to live in consideration of the longest lifespan their respective generation can ever live, which implies that education has acquired new dimensions global perspective and sustainability. In this sense, educational guidance can be defined as the development of consciousness, attitudes and behaviors gaining awareness and by taking into account a particular generation's longest lifespan possible. In other words education can be defined as a way which temporally sustainable and spatially universal by inviting and involving humans into a new affection (love)-based thinking and knowing dimension in the light of individual, social, cultural and universal (basic) values.

Values are the keystones of education. Unlike an educated person, a well-trained person is not necessarily a person with a command of professional practical capabilities, but one who has discovered value and the valuable, developed sensitivity about human dignity and acquired good manners, judgment, and a commitment to wisdom (Eryaman, 2007). According to Brockhaus (1953), an educated person has already discovered values accessible to himself or herself and made those

## International Journal of Progressive Education, Volume 11 Number 3, 2015 © 2015 INASED

values discoverable to others. Education is a process that man makes real by his own attitudes and behaviors. Winkel (2005) suggests that no matter how effective the external powers and factors are in human development, such internal (intrinsic) powers and factors as development of opportunities and potentials, the process of becoming a human being, becoming meaningful, (self-) discovery are more influential in education (Winkel, 2005, p. 496). Education should help individuals acquire responsibility through experience and reflective thinking on the basis of various texts, problems and positions (Wiater, 1995, p. 2). Therefore, people who believe that they are being lectured at do not learn. Values are learnt through participation and experience. In other words, experienced values can only be learnt if structured by the learner (Grammes, 2000, p. 354). The most effective method of value acquisition is to experience values. It is possible to be aware of values by experience or since they already exist in human perception. A person can experience a value only by forming a new and direct connection to it (Scheler, cited by Pieper, 2007, p. 245). Education should help individuals develop a consciousness of their position in relation to the universe, life and spirit and his position and place in this relation (Wilber, 2006; p. 12). Wilber emphasizes that an ecologic consciousness should be developed, and that this is possible only with a universal (cosmic) consciousness guiding the future. This universal consciousness encompasses material, life, mind and spirit and covers the entire universe (Wilber, 2006, p. 13; 2011, p. 39).

For Jung, the desires of the individual who has realized his or her connection with limitlessness and infinity even in this world will change forever. Jung thinks that this fact makes man meaningful and a person who misses this connection will lose the essential meaning as a human (Jung, 2009). This is where values and value education come in because the way to discover this wholeness is to discover it as a value. Affection/love are the source of all these values (Ergen, 2011, p. 263), in other words, without accepting others and allowing them to live with you, socialization cannot be achieved, and without socialization humanity cannot survive (Maturana & Verela 2009, p. 266).

People learn about language, religion, moral codes, culture, art, customs and traditions through such methods as observation, mimicking, modelling, and internalization (Güngör, 2000). Senses, feelings, beliefs, thoughts, values, goals, judgments and their interaction with the environment give structure to the human personality. The values, beliefs and attitudes acquired in the course of development process determine behavior (Tyler, 1965).

Values and value judgments guide the development of personality as a dynamic structure that changes over time because of countless internal and external factors (Knafo & Schwartz, 2004). This change should be monitored and managed by the individual; Rogers (1951) suggests that an individual should always revise his or her values. The constant revision of values is a dynamic of social change and a key to personal development (Schultz & Schultz, 2001).

The ability to understand how emotions affect performance, to become aware of our values and to be guided by them can be acquired only by self-consciousness. Besides, self-consciousness is still needed for the acquisition of emotional competencies like a realistic sense of limits, courage, and strengths resulting from our perfected skills, well-planned goals and realized values. People who are capable of recognizing their own emotions and their effects "have a guiding awareness of their values and goals" (Goleman, 1998). Thus, people should not be satisfied with people and things, but should find the treasure that is an integral part of existence (Comenius, 1998, p. 161). People need a valuebased education to be able to discover this treasure and to achieve this goal. There is no humanistic education not relying on values, education without values is not humanistic. Value-based education enables people to discover their most comprehensive and highest values and thus to discover themselves. Failure to do so would result in an underqualified humanistic education process.

### Values and Debated Issues

### Value Systems

Value perception and evaluation cannot occur without differences and discernments. Criteria that make evaluation possible comprise value systems and groups. There are several ways to systemize and categorize values. Values can be absolute or relative, in terms of their nature; as economic, theoretical, aesthetic, political, social and religious according to corresponding areas of life; as a person's value, an object's value, capital value, file value, function value, mental value, purposive value, achievement value, situational value, relational value, individual value, collective value according to their carrier; as terminal value, instrumental value, pragmatic values, authentic value in terms of their interrelations; as sensual value, vital value, spiritual value, moral value and religious value according to ranks of feelings; as physiological, psychological, mental, historical, humanistic values according to dimensions of knowledge acquired about human being; and according to experiences, attitudes, creativity (Boltin & Bolsinger 2010).

Chumakov (2000) regards human values as a key to solving global problems. Philosophers worldwide who convened in Boston in 1998 for the 20<sup>th</sup> World Congress of Philosophy to discuss the most important global problems of the 21<sup>st</sup> century concluded that the majority of the social, political, economic and ecological problems were related to revolutions in science and technology. This observation, which reveals the link between morality and technological achievements, highlights the necessity of moral re-evaluation and the need to be flexible concerning value orientations for global instability (Chumakov, 2000).

According to Einstein, "without ethical culture there is no salvation for humanity (Einstein 1951, 1991, p. 20). No matter how much science refrains from semantic truth, its effects on organisms and humans are not objective. For moral values to pioneer technological innovations, science should seek semantic truth. Just as no being and meaning can exist without an earthly object, there is no being and object without meaning. Natural sciences work to reveal the objective truth of being, while social and human sciences seek semantic truth. Therefore, rather than discussing the superiority of one over the other and causing irreversible consequences by opposing these two aspects, it is necessary to allow them to produce "masterpieces" by complementary work that each investigates different dimensions of being.

According to Tozlu, values can help the individual and society go beyond reality because they emerge and exist in the mind. In this sense, values not only bind individuals and communities but also ensure their continuity. On the one hand, values are a means of discernment for communities, on the other they are unifying and integrative because they are the source of shared social characteristics. While social values differentiate one society from the other, universal values unify humanity (Tozlu, 1992, p. 52). In other words, some values are specific to certain societies and ages and other values are universal shared by every society in every age. Some of the time- and space-independent values are justice, peace, understanding, forgiveness, courage, generosity, truthfulness, thoughtfulness, empathy, reliability, tolerance, collaboration, benevolence, leadership, compassion, kindness, self-confidence, patience, loyalty, respect, love, responsibility, thankfulness, fidelity, charity, joy of living, discipline, verbal and behavioral consistency (Aydın & Akyol Gürler, 2012, p. 8).

All values by nature, are multi-dimensionally and hierarchically organized (Albert, 2008). From this perspective, it is impossible to consider a value in isolation from a system of values. Given that there is no system without differences and discrimination, any system of any size contains values. Although there is literature on "system of values," the basic problem with this topic is the fact that there is no exhaustive classification of values based on their interrelations or characteristics. Previous studies discuss values only as subjective and situational rather than as an integrated qualitative body of integrated qualitative sub-systems. For example, for Kluckhohn, there is no linear hierarchy among values, only clusters. Some values may be prioritized over the others, not governed by universal

principles. Value classifications are not effective enough to multi-dimensionally (in depth, comprehensively, and in terms of their respective group) and account for the patterns and interrelations between among values. Those classifications adopt a unilateral methodology to examine value and they see values either in terms of a vertical or a horizontal structure.

Albert states that values exhibit a multidimensional and hierarchical structure, and a value's higher position in the hierarchy does not signify that it is absolute or more important. Their importance is determined on the basis of feasibility, urgency, or ability to satisfy basic needs (Albert, 2008, p. 8). The scope, depth, complexity and multidimensionality of values are too broad. There is a system of values for anything perceptible, apprehensible, and known. All values are interconnected, and no value can exist in isolation, independently of other values (Rokeach, 1973). For examples, social, artistic and physical values are intertwined; without our physical, that is, corporal existence, social and artistic values cannot exist. Scientific, educational, political values are related to all other values. When economic sources are scarce, they adversely affect all other values. Conversely, scientific, mental, and political values directly influence the economy (Min, 2000). Therefore, all values are integral parts of a qualitative hierarchy of values which are hierarchically organized.

## "Giving Value," Value Perception and Value Judgment

"To give value to somebody" is the literal translation of Turkish expression "değer vermek," used to express "how valuable somebody is," and literally means "assigning or transferring some amount of value to somebody." Similarly, the German (jemanden wertschätzen/würdigen) and the English phrases (valuing a person) have nearly the same meaning as the Turkish phrases. This understanding is not appropriate in consideration of the scope - value perception and value judgment of this study because the expression refers to "assignment of value to somebody," not to considering "human as a value." Human dignity is a value in its own right and "value" cannot be assigned to it. A value is discovered or realized, not assigned. In other words, man either accepts or denies the presence of a value. Humans cannot assign or transfer "value" to something whose value they cannot eliminate. It is therefore impossible for a human being to destroy or eradicate human dignity as long as there is an intellectual, emotional and spiritual life. Human being can only assign or transfer value to an object, meaningless in isolation - the existence of such an object is still controversial. As shown, "to give value to somebody" is not a proper usage since it denigrates human value and implies that some people have more value than others. What does vary are value perception, judgment, and the awareness of personal characteristics and behaviors. The incapability to investigate whether such expressions as "discovering value of a human being" or "being aware of his or her value" exist in every culture and language is among the limitations of the study. However, such an expression was not detected in Turkish, German and English literature. Further, even if such an expression existed in any language, it would be expected to occur as translated.

Even the simplest opinions on value are considered and discussed as the value itself. But opinions themselves are by no means "values" from a scientific perspective. In this sense, values are downgraded by individual, social and temporal value perceptions and judgments. As a conclusion, the perception prevails that nobody can know what values are really (more) important and necessary to lead a humane life style (Engelstädter & Weber, 2008, p. 1; Thierse, 2005, p. 8). By the same token, even though everybody is expected to act by basic human values, decisions on these values are not long-lasting, consistent and integrative, but provisional, situational, and case-based. In today's world, where the most enlightening ideas of cultural legacy which guide human history are incapable of providing a life style worthy of human being , it is doubted how effective the subjective value expressions and judgments can be in making a more humane life style.

Values are not only ideas and decisions that apply to human dignity, they are humanistic and social interrelations witch are connecting humans and societies (Engelstädter & Weber, 2008, pp. 1-2). It is impossible to establish a sustainable life worthy of humans with individual and provisional goals without setting a common goal for humanity. Even if social, organizational and individual goals seem

useful in the short run, they are unsustainable. Because the ethical elements of a humane life are basic human facts, they are regarded as universal. Hence, these values are fields of human activities and become diversified according to the relevant fields, such as economic, political, scientific, religious etc.; then, they form a pool of human values with social and regional manifestations (Engelstädter & Weber, 2008, p. 1).

As expressed above, value *per se* and value perception are basic and universal facts. From this perspective, only when value perceptions and value judgments derived from the concept and perception of value converge on a common ground can all misperceptions and misjudgments in the form of dilemmas and conflicts in perception pertaining about values be eradicated. The subject of "value," as a determinant of world peace can reach its potential only if pure values are introduced into daily life as purged of most dilemmas and conflicts.

### **Classification of Values**

Difficulties faced in the description/definition of values are also true for their classification. There are numerous views on how to classify values and what basic values are (Kluckhohn & Strodtbeck, 1953 /1973). Values can be individual and social, or ethical or aesthetical. Moreover, values are also categorized in consideration of whether they are general or specific and permanent or temporary, or according to their degree of difficulty and functions (Ünal, 1981). Another classification is based on values' origin and content, and contains worldly and transcendent values (Debats & Bartelds, 1996). Min (2000) has conducted an exhaustive study.

Everett's (1918) values are "(1) economic values, (2) bodily values, (3) value of recreation, (4) value of association, (5) character values, (6) aesthetic values, (7) intellectual values, (8) religious values" (cited by Min, 2000). Min (2000) adds

political values, social values, legal values, cultural values moral values, educational values, scholastic values, industrial values, athletic values, values of life, medical values, values of language, technical values and emotional values. In addition to values in our life, things have natural values, whether they are directly related to us humans or not. p. 1

Similar classifications were created by Forest (1973) and Fernandes (1999). Forest mentions values in terms of the environment, natural resources, and ecological relationships (Forest 1973). Following are additional classifications that have guided value research and been cited in scientific studies.

### E. Spranger's Value Classification

Spranger categorizes values as theoretical (scientific), economic, aesthetic, political, social and religious (Akbaş, 2004, 30-31).

Theoretical men attach importance to empiricism, reasoning and critical thinking; therefore they are empirical, critical and intellectual.

Men with economic values favor usefulness and practicality.

Aesthetic men see the highest value in grace, symmetry and fitness. They regard life as a procession of events and art as a necessity.

People who possess social values are characterized by the altruistic or philanthropic aspect of love, and they are kind, sympathetic and unselfish. The highest value is love of people for them.

Political people prioritize personal power, influence, and renown over anything else, and interested primarily in power.

Religious people see the universe as a whole and relate themselves to its unity. Moreover, for the sake of their own beliefs, they refrain from earthly pleasures (Akbaş, 2004, pp. 30-31).

A similar classification was produced by Allport, Vernon and Lindzey (1960). The value dimensions in this classification vary from person to person. Each person is guided by one or more values. The highest value for an individual determines his or her goal in life (Allport, Vernon & Lindzey, 1960, 133).

### C. K. M. Kluckhohn's Value Classification

Kluckhohn's (1951) value classification incorporates modality (e.g., positive and negative value); content (e.g., cognitive, moral and aesthetic value); generality (e.g., thematic and specific value); intent (e.g., instrumental and terminal value); intensity (e.g., categorical and preferential value); explicitness (e.g., implicit and explicit value); extent (e.g., personal and group value); and organization (e.g., systematic value) (Kluckhohn, 1951/1962).

### M. Rokeach's Value Classification

For Rokeach, values coexist in an interdependent network as follows. Honesty results in justice, justice in trust and trust in peace. No peace can be established without justice because without justice, trust cannot prevail (Rokeach, 1973). Values interact with and affect each other, and are organized in order of importance and priority (Güngör, 2000).

Rokeach categorizes values as terminal and instrumental. Terminal values have desirable expected end-states, defined as aims and goals. Among the terminal values are peace, safety, wisdom, religious maturity, justice, friendship, and a world of beauty, inner harmony, self-respect, happiness, freedom, welfare, social recognition, and pleasure (Rokeach, 1973). There is a relatively small number of terminal values.

In contrast, instrumental values are universal and less variable. They are expected to help an individual, a group, or a society reach terminal values. They are thus relative (Rokeach, 1973). It is impossible to draw a line between instrumental and terminal values. While terminal values are ultimate goals for other values lower in rank to achieve, they are instrumental for the ones at a higher rank. For instance, honesty may be an instrumental value for trust, which is an instrumental value for peace (Argandona, 2003, p. 18). Among instrumental values are independence, forgiveness, courage, honesty, broad-mindedness, self-control, politeness, logic, cheerfulness, love, responsibility, cleanliness, helpfulness, imagination, ambition, capability and intellect (Rokeach, 1973).

#### S. H. Schwartz's Value Classification

Schwartz (1992) describes higher and lower values on the basis of three universal requirements of the human condition: "needs of individuals as biological **organisms**, requisites of coordinated social **interaction**, and survival and welfare needs of **groups**" (Devos, Spini & Schwartz, 2002; Schwartz, 1992; Schwartz, Schmidt & Bamberg *et al.*, 2007, p. 262).

High Values	Value	Terminal Values and The	Sources	
	Types			
	Self-	Independent thought and	Creativity, freedom,	The needs of organism
	direction	action; Independent	independence,	for mastery and the
<b>Openness to</b>		production and exploring	independent choosing,	interaction requirements
Change:			curiosity, self-respect	of autonomy and

Table 1 Schwartz's Value Classification

Independent				independence
action, thought	Stimulation	Excitement, novelty, and	An ever-changing and	The need of organism
and feeling and		challenge in life	exciting life, self-	for variety, change and
readiness for			confidence and courage	inspiration
new experience	Hedonism	Pleasure and sensuous	pleasure, enjoying life	The need of an
		gratification for oneself		organism for pleasure
Self-	Achievement	Personal success through	ambitious, successful,	Interaction/group
enhancement:		demonstrating competence	capable, influential,	Provision of vital
Being in pursuit		according to social	wisdom	sources
of achievement		standards		
and ruling other	Power	Social status and prestige,	social power, authority,	Interaction/group
people		control or dominance over	wealth, preserving my	Justification of social
		people and resources	public image	strata and institution
<b>Conservation:</b>	Security	Social and individual	national security, family	Organism/interaction/
Safety,		security, order, strong	security, clean, social	group; securing social
harmony and		society	order, reciprocation of	and individual needs
stability of			favors	
society,	Conformity	Restraint of actions,	obedience, honoring	Interaction/group;
of relationships		inclinations, and impulses	elders, self-discipline,	establishing social
and of self.		likely to upset or harm	politeness	order with social
Preservation of		others and violate social		norms and obedience
traditions and		expectations or norms		
obedience	Tradition	Respect, commitment, and	respect for tradition,	Group; shared values,
		acceptance of the customs	moderate, devout,	solidarity and integrity
		and ideas that traditional	humble, accepting one's	for a strong society
		culture or religion provide	portion in life	
		the self		
Transcendence:	Benevolence	Preservation and	helpful, honest,	Organism/Interaction/
Respect for		enhancement of the	forgiving, loyal,	Group; The need for
others and		welfare of people with	responsible	belonging and smooth
concern for		whom one is in frequent		functioning of group
their welfare		personal contact.		
and interests		Understanding,	social justice, equality,	Interaction/Group/
		appreciation, tolerance,	world at peace,	Organism; Individual
	Universalism	and protection for the	protecting	and group's need for
		welfare of all people and	the environment, unity	survival
		for nature	with nature, world of	
			beauty, broadminded,	
			wisdom	

Acquired from http://segr-did2.fmag.unict.it/Allegati/convegno%207-8-10-05/Schwartzpaper.pdf

## Hilmi Ziya Ülken's Value Classification

Ülken (2001) categorizes values as immanent (technical, artistic and intellectual), transcendent (moral and religious) and normative (linguistic, legal and economic) (cited by Poyraz, 2007, pp. 85-86). According to Ülken, immanent values comprise the "culture" that humans create by using natural materials. Within the technical domain, men use their hands and minds to produce tools, devices, and machines from earth, water and underground resources. Works of art are created when hands and minds use colors, sounds, stones, mud and emotion. In the intellectual domain, hands and minds form informational and conceptual systems based on observation, experience and reason. Ülken states that the first of these value domains is based on senses, the second on senses and emotions, and the third

on concepts with the help of the first two. But because all three are created with natural and mental data – ingredients of human consciousness, they are referred to as immanent values (cited by Poyraz, 2007).

Transcendent values are associated with human relations to the living and the dead. Immanent values are supra-individual, meaning that they cannot go beyond the consciousness. However, transcendent values belong to an individual's relations to "others" and "other realms" that are inaccessible by consciousness. It is impossible to influence it through knowledge. Understanding others and establishing interpersonal relationships can be achieved by believing, not knowing. Transcendent values go beyond the "knowing" domain, and enter the "believing" domain. Religion, as a commitment to moral values and relation to "other realms," can be reached by believing rather than knowing; therefore, these values are "transcendent" (cited by Poyraz, 2007).

## Hierarchical Structure of Values – Classification of Values by Their Superiorities

According to Min (2000) the realm of existence has limitless power and values over all living organisms. For example, the stars have values of sustenance and change, of combination and dissolution, of conservation and generation, and of stillness and movement. Moreover, weight, energy, objects and light have their own values. Thus nature has many values which constitute the basis of human existence.

Values can be (1) individual and social, (2) natural and artificial, (3) physical and mental, (4) instrumental and intrinsic, (5) temporary and permanent, (6) exclusive and universal, (7) lower and higher, (8) unproductive and productive, (9) active and inactive, (10) personal and impersonal, (11) theoretical and practical, (12) relative and absolute. Values are indeed manifold, countless, and interconnected (Min, 2000).

Max Scheler (1921) claims that there higher and lower values. This scale of values is objective, independent of any cultural and personal ressentiment. In order to determine the ranking of these values, the following principles should be kept in mind:

1. The more enduring a value is, the higher it is in the hierarchy. For instance, the spiritual value of justice as an enduring value is higher than the transient value of joy.

2. The less divisible a value is, the higher it is. Material goods, for example, are divisible and the more divisible they get, the less valuable they become. In contrast, spiritual values cannot be subdivided. They acquire a higher quality as more people adopt them.

3. The more capable a value is of nurturing other values, the higher it is. A value that constitutes the foundation of another value is higher. A value is of a lower quality if substantiated by another that is higher.

4. The more contentment a value gives, the higher it is. For example, while delight is powerful but superficial, love and trust as spiritual and mental contentment are deeper.

5. The more independent of individual perceptions a value is, the higher it is (to the extent of its absoluteness). Excitement depends on individual perception, but life, safety and security are the basic human needs (Scheler, 1921, p. 88). In accordance with these principles, Scheler ranks values from "lower" to "higher": 1. Sensual values, 2. Values of utility, 3.Vital values, 4. Mental (Psychic) values, 5. Values of the holy.

Scheler's five criteria can eliminate the misconceptions and misjudgments about values and arrange values in terms of quality. Scheler considers spiritual values to be higher than transient and physical values. By the same token, spiritual peace and tranquility are more important than biological satisfaction and a meaningful life is more important than sensual pleasure. According to Scheler,

ethical or moral behaviors should parallel the hierarchical structure of values. For example, when a man has to decide between buying a new car and paying for his cancer surgery, he is expected to choose the latter (Scheler, 1921).

Hartmann (1962) states that this classification highlights the qualitative difference between values. His proposed realm of being consists of four strata. The highest stratum is of spiritual being. Below it is the stratum of psychic being then the stratum of organic beings with inorganic beings at the bottom. For Hartmann, a being at a higher stratum is formed out of the ones in the lower strata. The spiritual stratum consists only of men; the stratum of psychic beings consists of men and higher animals. In the stratum of organic beings are comprised of men, higher animals and lower animals like plants, whereas the stratum of inorganic (physical) beings is composed of men, higher animals, plants and inanimate substances (Hartmann, 1962). All beings in the real world can be found in the stratum of inorganic beings. Therefore, this stratum is the basic stratum of the real world. If it is destroyed, the higher strata cannot survive. Its existence is essential and vital; thus, to sin against this stratum is the most grievous crime. As Hartmann puts it, just as there are values, there are anti-values, one of which is murder (Hartmann, 1962).

Min revealed that this category of anti-value is composed of felonies. The lowest felonies are destruction of the earth, the annihilation of mankind and all living organisms The second-lowest are mass killing of people in war or the acts of treason. Murder is third. Inflicting physical harm on a person is fourth. damaging the body of a human. Harming society is fifth, and all other crimes are sixth (Min, 2000).

For Min, values can be ranked: (1) absolute values such as truth, goodness, beauty, and holiness, (2) contributing to the development and happiness of the mankind, (3) serving one's nation or state, (4) contributing to the regional society, social organizations, the work place, the school (5) cultivating oneself and taking care of one's family (Min, 2000). As the lowest act we can add living only by minding one's own happiness. Humans are inclined to pursue their own pleasure rather than absolute goodness. Absolute goodness, however, is a higher value than pleasure. To aspire to absolute goodness, people should discover and internalize values and their meanings on their own. This cannot be forced or coerced, but through the acquisition of *ad hoc* skills and knowledge through education based conscience (Min, 2000).

### A New Model of Values Hierarchy

A value can exist only in interaction with all other values. What matters is awareness about the position/rank of a value in terms of its relation to other values in terms of quality, importance, priority and urgency. The lack of a hierarchical structure to facilitate the analysis of values has caused every value to be regarded as relative, i.e. individual and subjective and therefore they have been studied in terms of their subjective superiority, importance, priority and urgency. In addition, some researchers have claimed that a value's urgency and capability of satisfying a person's needs are what determine its position and significance in the hierarchy (Turgut, 2010, p. 17). However, urgency is not necessarily way to assess the characteristics of a value because so-called urgent values are sometimes chosen over more important ones.

This study discusses the structure and characteristics of the hierarchical system that can facilitate the description of values' interrelations and positions/ranks from a critical, conscious and reflective perspective. To this end, it is necessary to classify values in terms of their sources, i.e. their form of emergence, in the first place, and then by their dimensions and contents; in other words, their domain of validity. Their sources, that is, from what they are derived and how they are formed, offer significant tips pertaining to their characteristics. According to their sources, values consist of three groups, namely assigned/transferred, produced/generated and discovered/realized. All values derive from these three sources and a value must have at least one source. One of the basic determinants of a value is its "sustainability." If a value is not sustainable, then it is of a lower rank.

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### **Assigned/Transferred Values**

Only man assigns value to materials (Büyükdüvenci, 2003). The value assigned to an object shows how much it is worth to whoever assigned that value (Ünal, 1981; cited by Sağnak, 2005: 150). This set of values refers to values that are not valuable on their own. These are significations or values which are *assigned or transferred* to something. They are the lowest in rank in terms of quality and superiority. For example, a souvenir is a value of this kind. *Assigned/transferred values* can be categorized into four sub-domains according to assigners: *Individual assigned* values are the most subjective, transient, narrow in scope and the least valid. They are worthless to a second party. The literature tends to describe these as individual values. The other types of values are *organizationally assigned* (values assigned by a group), socially assigned, culturally assigned and universally/globally assigned. The hierarchy of these values are at the top. The latter are the most comprehensive and valid values because they derive from a common sense and cultural accumulation. These values vary by individuals, societies, cultures and time.

### **Produced/generated values**

These *produced/generated values* as the category of instrumental values are located in the middle of the hierarchy. They are the products of sustained and relentless effort. Assigned values, produced/generated values can be *individually produced*, *organizationally produced*, *socially produced*, *culturally produced* and *universally/globally produced*. Hera again, individually produced values are at the bottom of this hierarchical structure and are the least valid. Globally produced values are the highest, most comprehensive and most valid. Money is such a value. It is a functional trading instrument. Most of the research in the natural sciences is produced values. These values may be transient and vary according to individuals, communities, culture and time.

### **Discovered/realized values**

The *discovered/realized values* can be referred as the discovery of the values which are absolute like absolute goodness, absolute beauty, absolute justice and divinity as in the idealism. Discovered values can also be regarded as the product of a higher consciousness and culture as defined by realistic philosophy. *Discovered values* are characterized by unchangeability, permanence, sustainability, in other words, they are universal and time-independent and thus have the highest validity. Neither assigned nor produced, is each a factual value *per se*. These values are inherent in the nature of remaining hidden unless discovered. People may be denied, overlook and refuse to accept their existence, but cannot ever damage and destroy them (von Hentig, 1999, 45). Hentig stresses that values are not produced by people or ethics. Values exist independently of human beings, and are described by humans, accounted for, justified, approved by ethics, and put into a hierarchical order (Hentig, 1999, p. 69).

For Scheler, values are supra-individual, supra-cultural, and thus timeless. Values are independent of and superior to any empirical and statistical condition, so they are universal and have an emotional dimension for Scheler and a rational dimension for Kant (Scheler, 1921). Discovered values are also terminal values for being supracultural, timeless, and transcendent. All other values derive from discovered values and are instrumental to reach them. Discovered values can be *individually discovered*, *organizationally discovered*, *socially discovered*, *culturally discovered* and *universally/globally discovered*. Some of findings in the social and human sciences that reveal semantic judgments and truths are discovered values. Even if people, societies, cultures and times have changed, these values remain eternal. What changes, are the value perceptions and judgments and awareness about them. Hence, value perceptions and judgments cannot be discussed as if they were absolute values. Vitality, being, nature, human being and dignity, will, intelligence, emotions, love, respect, trust, responsibility, goodness, divineness, freedom, interaction, solidarity, justice, protection exemplify discovered values. These values sit at the top of the hierarchy of values and form the basis

## International Journal of Progressive Education, Volume 11 Number 3, 2015 © 2015 INASED

of all other values. For example, vitality is a discovered value that is essential to the others. It is unchangeable, universal, timeless, and unquestionable. Without consciousness, it is impossible to *assign, generate* and *discover*. That is to say, anything that motivates all conscious beings to realize their potential is valuable and is therefore a value. As the only conscious beings, humans are value-generating beings thanks to this feature. Values' sources and types determine the dimension and scope of these values' in other words, their validity. It is possible to classify these areas as individual, organizational, cultural and global/universal. The more valid a value, the higher it is. For instance, the dimension and scope of an individually assigned value is covered by individual values, therefore, a value of this kind is the most relative, subjective and transient, making it the lowest value in the hierarchy. The apex of this hierarchical structure is occupied by globally/universally discovered values. The most comprehensive value in terms of sustainable humanism (free of personal interests) is the highest, the most transient and the least comprehensive value marked by selfishness and self-seeking is the lowest. The next section introduces a new model of value hierarchy.

### **Individual Values as Microsystems**

Individual values refer to individual ideals and concepts to which an individual attaches importance. Values affect a person's lifestyle, attitudes, principles and valuing something deriving from his or her personality. Values are integrated with a person's world view and determine his or her priorities (Hostetter, 2003, p. 13). Individual values are products of culture and social systems because culture affects behaviors through the values instilled in its members (Uyguç, 2001). Individuals form a system of values in social life and this individual values system is governed by a shared culture (Bradshaw et al., 2001). In short, individual values hinting the unique characteristics of an individual and denote a person's perceptions, judgments and interpretations of assigned, generated and discovered values.

### **Organizational Values as a Mesosystem**

Values exist and develop at the individual and organizational levels (Aydın, 2001). At the organizational level, values can be conceptualized as measurable elements of organizational culture (McDonald & Gandz, 1991; Sağnak, 2004). Organizations too have values and value systems (Pang, 1994). In order to analyze the decision-making processes in an organization, it is important to know that organization's goals and values (Clemen, 1996, 19). An organization's elemental values are the expression of its philosophy and ideology (Clark, 1992, 202). Deal and Kennedy (1982) define values as the fundamental beliefs of an organization and as the heart of its culture (cited by Gizir, 2003). To sum up, organizational values are the perception, judgment and interpretation pertaining to assigned, generated and discovered values that characterize an organization.

## Social and Cultural Values as Mesosystem and Exosystem

Özlem (2002) defines values as generalized principles and beliefs that entirety of a social group or community considers necessary for its own existence, unity and operation and that reflect the shared emotions, thoughts, goals and interests of its members. A culture's values are organized in order of their importance. This hierarchy is based on the values' reliability and persistence in system and their capability of influencing social life. Values higher in rank are more important, reliable, persistent and change-resistant than low values, and used more frequently for social control because of their higher acceptability. Lachman et al. (1994) call these "core values" (Lachman et al., 1994, p. 41).

In this sense, social values are standards by which groups and communities determine what is desirable or undesirable, acceptable or unacceptable, and right or wrong. These values refer to social perceptions, judgments and interpretations related to the transferred, produced and discovered values that characterize a society. Among the values strengthening a social life worthy of human dignity are integrity, empathy, friendship, harmony, peaceful attitude, protectiveness, benevolence, politeness, grace, sincerity, communication competence, collaboration, participation, understanding, loyalty,

forgiveness, congruence, patience, sacrifice, altruism, responsibility, cleanness, self-control, temperance, safety and security, courage, transparency, broad-mindedness, happiness, tenderness, authentic productivity.

### **Global/Universal Values as a Macrosystem**

Global values refer to the perceptions, judgments and interpretations concerning transferred, produced and discovered values. Philosophers and sociologists agree that all humans share some values. Universal values appearing through discovery and awareness of the absolute are timeless and transcendent. Universal values have been defined as discovered values in this study.

According to Leithwood *et al.*, over the last century, some new universal values have appeared. Among these are openness to new views and participation, tolerance, questioning, critical thinking, interdependence, and openness to mistakes (Leithwood *et al.* 2003; cited from Yılmaz, 2008, p. 94). At the same time, the paradigm of limitless consumption and luxurious lifestyle represents as universal modern values has failed because such a lifestyle for everybody on earth is not sustainable because of world's resources such as mines, energy. Thanks to the globalization, men have rediscovered such old values as thrift, patience and solidarity. These are not individual values for individual happiness but universal values essential to a sustainable world. In order to educate to peaceful, good-tempered and happy individuals, there is an urgent need for a paradigm shift to rearrange value perceptions and judgments in science and culture.

### Historical Dimensions of Values as a Chronosystem

This dimension refers to the historical basis of values, in other words to values bequeathed from previous generations. They lay bare the values that governed the past and the present. The model depicts the hierarchy of values. It also shows their sources, dimensions and types. The model makes possible that it is possible to analyze each value and identifies its characteristics in their categories and dimensions. Values are shown to create microsystems, mesosystems, exosystems, macrosystems, and chronosystems. It is possible to extend these categories, for example like from objects derived and form values so on.

Table 2 Hierarchical Structure of Values



Transient, relative, the least comprehensive, the lowest values, and the lowest awareness

### **Do Values Really Conflict?**

There is no society without values (Özensel, 2003). In this sense, values pertain to shared social reality and produce the rationale, justifications and evaluation criteria needed to account for behavioral patterns peculiar to a given group, society or culture. An individual creates his or her own values and attitude by interpreting socially structured values, by relating them to his or her needs and motivations, and then transforming those values into subjective judgments. Each person can evaluate his or her interpretations, evaluations, decisions and behaviors by comparing them to those of others. Yaman defines *values* as an individual's interests, as his or her sensitivity to an event, situation, human and object, knowledge, acquired consciousness and wisdom (Yaman, 2012, p. 17; Yaman, 2013).

There exists a value system for whatever is perceived in life. Many value perceptions and value judgments are derived from these value systems. A person should be aware and be able to justify his or her goals and desires in reference to his or her values. No discovered value is relative. Relative are the individual, social and cultural value perceptions and judgments of individuals pertaining to these values. Furthermore, every individual has a different awareness of values. Despite these individual differences, the judgment situations are discussed as if the values were different per se. The misconception that values are relative causes people to mistake these conflicting perceptions and judgments for conflicting values. Thus will be destroyed the common of the humanity. None of the discovered values conflict or cause conflicts except under extraordinary conditions, for example when only one of two organisms can be rescued. It is the value perceptions, judgments and conceptions that cause conflict. Moreover, these conflicts are generally artificial and caused by a categorical mistake. In conflict situations values must be categorized correctly because each value must be compared with another in the same category. This is a categorical mistake. This is the cause of the misconception that values conflict. A discovered value is a complement to another. Artificially comparing a subjective value in one dimension with a discovered value in another is a categorical mistake, not conflict. That is, juxtaposing abortion as a value in the individual dimension of freedom (the right to have a say in one's body and life) with the right to live as discovered universal value results in a categorical mistake. In this case, an artificial conflict has been created by discussing the composition between an individual value (the right to control one's own body and life) and a universal value (the right to live) as if they were equal. As a matter of fact, the right to live as a value is always superior to the right to control one's own body and life. Hence, the right to live (i.e. value of human life) and freedom never conflict except in extraordinary cases, but instead they are complementary. The value perceptions and judgments are what conflict.

In another example, people have the right to eat whatever they want, but if this choice costs a life, people are expected and even required to change their choices and eat something that doesn't require someone to die. The right to life is superior to the right to eat. As understood, what really conflicts are individually, socially, and culturally subjectivized value perceptions, judgments and conceptions. The only way to eliminate these conflicts is to re-consider value perceptions and judgments by analyzing the corresponding values in their rightful categories. If it proves unfruitful, it can be achieved by comparing value perceptions and judgments in the light of their positions and specifications in the higher category and if need be by repeating the analyzing process up to the top category and by increasing the awareness of the value in question.

Another debated issue is the juxtaposition of the values of security and freedom. These two values can replace each other in an extraordinary case. In a period of terrorism, security can be prioritized over freedom because protection of life is a basic universal value. When the danger is eliminated, freedom becomes the superior value once more. This case is not indicative of relativity and conflict of values; on the contrary, it is natural because security is a prerequisite of freedom.

### Conclusion

The realm of being includes numerous values that humans can discover. Considering these values as interrelated rather than as random and independent places the discussion of value perceptions and judgments on solid ground. Bauch defines *values* as a body of interactive obligatory responsibilities waiting to come alive and to be realized (Bauch 1923). Cohn (1932) defines the science of values as the science of realizing value. As expressed above, the common denominator of any human activity is purpose or intention. Such a holistic system of values helps realize, question, and determine the position, importance and legitimacy of these intentions in terms of values. At the same time, organizing education and designing character education programs will fail to instill the desired value consciousness unless students acquire the semantic integrity concerning values which are considered to be acceptable at present but whose scope, sustainability and quality are likely to change. The researcher believes that the model should open up new dimensions in developing character education programs and in creating holistic value perceptions and judgments. As this model suggests, rather than instill value perceptions and judgments, actors in value and character education should understand that such education programs which helping individuals to understand value perceptions and judgments are flexible and dynamic. Therefore, instructional design should focus on value perceptions and judgments that are constantly being critically and reflectively revised. Unlike beliefs, values are principles offer sustainable justification for attitudes and behaviors. Acquisition of such sustainable principles is crucial for a person to develop a strong and consistent personality. The path to attaining these principles entails discovering and being aware of values as a holistic system. Therefore, this study serves as an inspiration for value and character education.

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