Turkish Journal of Education

TURJE

First puplished in 2012

www.turje.org | April, 2017 | Volume 6, Issue 2 | ISSN: 2147-2858

Turkish Journal of Education (TURJE) seeks to bridge and integrate the intellectual, methodological, and substantive diversity of educational scholarship, and to encourage a vigorous dialogue between educational scholars and practitioners.

TURJE publishes research, theoretical statements, philosophical arguments, and critical syntheses of a field of education.

Azerbaycan Avenue 16/21 46040 Dulkadiroğlu Kahramanmaraş/TURKEY

Journal Name: Turkish Journal of Education Türk Eğitim Dergisi

Acronym: TURJE

Turkish and English Quarterly Publishing Scientific Peer Reviewed Online Journal

Türkçe ve İngilizce Olarak Üç Ayda Bir Yayımlanan Bilimsel Hakemli Elektronik Dergi

ISSN: 2147-2858
Year: 2017
Volume: 6 Issue: 2
URL: www.turje.org
Email: turjeonline@gmail.com
Address: Azerbaycan Avenue 16/21 46040 Kahramanmaraş/Turkey

The Turkish Journal of Education (TURJE) seeks to bridge and integrate the intellectual, methodological, and substantive diversity of educational scholarship, and to encourage a vigorous dialogue between educational scholars and practitioners. TURJE publishes research, theoretical statements, philosophical arguments, and critical syntheses of a field of education.

First published in 2012

Table of Contents İçindekiler

Editorial Board Editörler Kurulu

Editors in Chief
Prof.Dr. Selahiddin Öğülmüş
Assoc. Prof. Dr. Mehmet Tekerek

Executive Editor
Assist.Prof.Dr. Ümran Betül Cebesoy

Field Editors for Volume (6) Issue (2)

Science Education Fen Eğitimi	Prof.Dr. Bayram Coştu (Yıldız Technical University)
Foreign Languages Education Yabancı Diller Eğitimi	Assist.Prof.Dr. Reyhan Ağçam (Kahramanmaraş Sütçüimam University)
Measurement and Evaluation in Education Eğitimde Ölçme ve Değerlendirme	Assist. Prof.Dr. Erkan Hasan Atalmış (Kahramanmaraş Sütçüimam University)
Physical Education and Sport Beden Eğitimi ve Spor	Prof.Dr. Ökkeş Alpaslan Gençay (Kahramanmaraş Sütçüimam University)
Engineering Education Mühendislik Eğitimi	Prof.Dr. Edward Reeve (Utah State University)

Editorial Board Editörler Kurulu

Field Editors

Art Education Sanat Eğitimi	Assoc.Prof.Dr. Abbas Ketizmen (Gazi University)
Computer Education and Instructional Technology Bilgisayar ve Öğretim Teknolojileri Eğitimi	Prof.Dr. Hakan Tüzün (Hacettepe University)
Curriculum Development in Education Eğitimde Program Geliştirme	Assist.Prof.Dr. Cem Babadoğan (Ankara University)
Education Management Eğitim Yönetimi	Assist.Prof.Dr. Ramazan Yirci (Kahramanmaraş Sütçüimam University)
Engineering Education Mühendislik Eğitimi	Prof.Dr. Kurt Becker (Utah State University) Assoc. Prof. Dr. Mehmet Tekerek (Kahramanmaraş Sütçüimam University)
Foreign Languages Education Yabancı Diller Eğitimi	Assist.Prof.Dr. Ekaterina Arshavskaya (Utah State University)
Physical Education and Sport Beden Eğitimi ve Spor	Prof.Dr. Ökkeş Alpaslan Gençay (Kahramanmaraş Sütçüimam University)
Mathematics Education Matematik Eğitimi	Prof.Dr. Safure Bulut (Middle East Technical University)
Measurement and Evaluation in Education Eğitimde Ölçme ve Değerlendirme	Assist. Prof.Dr. Erkan Hasan Atalmış (Kahramanmaraş Sütçüimam University)
Science Education Fen Eğitimi	Prof.Dr. Bayram Coştu (Yıldız Technical University) Assoc.Prof.Dr. Pavol Prokop (Trnava University)
Social Sciences Education Sosyal Alanlar Eğitimi Eğitimi	Assoc.Prof.Dr. Ahmet Nalçacı (Kahramanmaraş Sütçüimam University)
Special Education Özel Eğitim	Assist.Prof.Dr. Şule Güçyeter (Uşak University)
STEM Education FeTeMM Eğitimi	Assoc.Prof.Dr. M.Sencer Corlu (Bahçeşehir University)
Teacher Training Öğretmen Yetiştirme	Assoc.Prof.Dr. Kadir Bilen (Alanya Alaaddin Keykubat University)
Psychological Counseling and Guidance Psikolojik Danışmanlık ve Rehberlik	Assist.Prof.Dr. Ramin Aliyev (Hasan Kalyoncu University)
Technology Education Teknoloji Eğitimi	Prof.Dr. Edward Reeve (Utah State University) Assoc.Prof.Dr. Abdullah Togay (Gazi University)
Turkish Language Education Türkçe Eğitimi	Assoc.Prof.Dr. Kasım Yıldırım (Muğla Sıtkı Koçman University)

Language Editor

English Language	Assist.Prof.Dr. Reyhan Ağçam (Kahramanmaraş Sütçüimam University)

Reviewers of Issue Sayı Hakemleri

Dr. Abdullah Togay
Dr. Adem Imali
Dr. Adem Tekerek
Dr. Ayşe Savran Gencer
Dr. Ceyhun Yükselir
Dr. Erkan Hasan Atalmış
Dr. Fatih Murathan
Dr. Gül Hanım Boran
Dr. Hülya Tuncer
Dr. Mustafa Yazıcı
Dr. Mücahit Köse
Dr. Sebahattin Devecioğlu
Dr. Sedat Şen

To join our Reviewer Team please send your CV to us. turjeonline@gmail.com

Indexing Dizinler

CLARIVATE ANALYTICS EMERGING SOURCES CITATION INDEX INDEXED

by EBSCO Education Source

News Yeni

Turkish Journal of Education TURJE

Starting a new conference organization;
www.educcon.org

TURJE
www.turje.org

Volume 6 Issue 2

DOI: 10.19128/turje.270298

Turkish Journal of Education
Research Article

Received 28.11.2016
Accepted 12.04.2017

Comparison of sustained attention skills of deaf athletes and non-athletes

Yunus Gür
Kahramanmaraş Sütçüimam University, School of Physical Education and Sports, Kahramanmaraş, Turkey, yunusgur123@gmail.com
Selçuk Gençay
Kahramanmaraş Sütçüimam University, School of Physical Education and Sports, Kahramanmaraş, Turkey, sgencay@ksu.edu.tr
Ercan Gür
Fırat University, Sport Sciences Faculty, Elazığ, Turkey, egur23@gmail.com

ABSTRACT In this research it is aimed to compare the attention skills of hearing-impaired children playing sports and who do not. In total, 233 hearing-impaired children living in the cities; Malatya, Elazığ, Gaziantep and Istanbul participated to the research. SPSS program were used for statistical analysis of the data obtained in the study and the level of statistical significance was determined as ($p < .05$). At the end of the research, it has been found that the attention levels of hearing-impaired children who play sports show statistically significant difference according to their gender ($p < .05$). As a result, it seems that when it is compared with hearing-impaired children who do not play sports, the demographic variables have a lower impact on the attention levels of the ones, who play sports.

Keywords *Impairment, hearing impairment, children, sport, attention level*

İşitme engelli sporcuların sürekli dikkat becerilerinin sporcu olmayanlarla karşılaştırılması

ÖZ Bu araştırmada, spor yapan işitme engelli çocuklar ile spor yapmayan işitme engelli çocukların dikkat becerilerinin karşılaştırılması amaçlanmıştır. Araştırmaya Malatya, Elazığ, Gaziantep ve İstanbul illerinde yaşayan toplam 233 işitme engelli çocuk katılmıştır. Araştırmada elde edilen verilerin istatistiksel analizlerinde SPSS programı kullanılmış ve istatistiksel açıdan anlamlılık düzeyi ($p < .05$) olarak belirlenmiştir. Araştırmanın sonunda, spor yapan işitme engelli bireylerde, dikkat düzeyinin cinsiyete göre istatistiksel açıdan anlamlı farklılık gösterdiği tespit edilmiştir ($p < .05$). Sonuç olarak, spor yapmayan işitme engelli çocuklar ile kıyaslandığı zaman demografik değişkenlerin, spor yapan çocukların dikkat düzeyleri üzerinde daha düşük etkiye sahip olduğu söylenebilir.

Anahtar Kelimeler *Engellilik, işitme engeli, çocuk, spor, dikkat düzeyi*

INTRODUCTION

People come to the world on equal terms, and it is known that people have equal rights in all areas of life. On the other hand, some groups of people cannot have the same rights as other people because of their social, physical and cognitive characteristics they have in society. Disabled people are an important part of the mentioned barrier groups (Subaşıoğlu, 2008). When genetically assessed, disability is defined as a biological disease (Demirbilek, 2013), and in the United Nations Declaration of Injuries, the disabled individual is described as "an individual who cannot do his or her own work due to any deficiency"(Öztürk, 2011).

One of the groups frequently encountered in disabled people is the hearing impaired individuals. Individuals with partial hearing loss in one or both ears are defined as hearing impaired individuals (Ozturk, 2011) Hearing impaired individuals face with many problems in their lives. For this reason, it negatively affects the health and quality of life of the hearing impaired individual (Agrawal, et. al., 2008). When addressed physically, the main problems of hearing-impaired individuals are balance problems in displaying basic kinetic movements such as running, walking, sitting, etc. (T. C. Ministry of National Education [MEB], 2010).

In conceptual terms, the concept of sport is a phenomenon that is aimed at winning the competition, which requires a physical, mental and technical effort, aesthetic sensation in the followers, intertwined with fields such as physiology, biomechanics and psychology (Çoban & Ünveren, 2007). Participation in sports activities has many benefits in terms of the individual and it is emphasized in researches that participation in sport supports the mental development and maintains the psychological health (Şenyüz, 2013; De Moor et al., 2006; Şahin, Yetim, & Çelik, 2012; Ströhle, 2009; Shepherd & Unveren, 2007). As for the individuals showing a normal development, there are some psychological benefits of participation in the sports for disabled individuals as well. According to Yetim (2014), participating in sport events contributes to social roles of disabled people by arousing feelings of trust, discipline, competitiveness and friendship. According to Taşkın (2014), disabled people's participation in the sports increases the self-confidence level, supports the self-development and increases the motivation of life.

When considered conceptually, attention is considered as the head orchestra conductor of the brain. Because attention is the administrative bureau and regulatory center in which the brain accepts to learn. Attention also controls the distribution of mental energy in the brain. For instance, attention determines whether a student will concentrate on the teacher who is instructing or concentrate on the conversation with his classmate next to him. In addition to this, the high level of attention contributes to the long-term activeness of the mind on the work dealt with. On the other hand, the lack of attention leads to the production of the excuses to leave the job (Güllü, 2012). Research findings existing in the literature show that participation in the sports effects the attention skill positively (Asan, 2011; Dereceli, 2011). However, research findings evaluating the effects of sport involvement on attention skills of hearing-impaired individuals have been found to be limited. In this context, it is aimed in this research to compare the attention skills of hearing impaired individuals who do sports and who do not.

METHOD

Research Model

In this study, "Screening Model" which is a frequently used research model in education and social sciences has been used. The surveys conducted according to the screening model are carried out in order to determine the characteristics that have been the research topic of some demographic characteristics (age, sex, marital status, education level, income status, etc.) of large sample groups. In addition to this, researches which are conducted according to the screening model are evaluated as descriptive research (Can, 2014).

Working Group

135 children who play sport regularly and 98 children who do not have a regular sport habit, 233 hearing-impared individuals in total, who accommodate in the cities of Malatya, Elazığ, Gaziantep and Istanbul, participated to the research. When the distribution of hearing-impaired individuals participating in the research is evaluated according to the places they reside, it's been determined that

17 children who play sport and 9 children who do not play sport in Malatya, 21 children who play and 14 who do not in Elazığ, 23 children who play and 26 who do not in Gaziantep, and 74 children who play and 49 who do not in İstanbul participated to the research. When the distributions according to gender were evaluated, it was determined that 92 of the hearing impaired children who play sports were male and 43 were female, and 41 of the hearing impaired children who do not play sports were female and 57 were male.

Bourdon Attention Test

The Bourdon Attention Test was used to identify the attentional skills of hearing-impaired children participating in the study. The most recently used form of the Burdon Attention Test was developed by Benjamin Bourdon in 1955 and the test consists of two forms. The first one of these forms is applied by finding and marking certain letters among mixed letters. The second form is implemented by finding and marking some figures and shapes among mixed figures and shapes (Brickenkamp, 1975; Acta: Kaymak, 2003). In this study, letter finding method, which is the first form of the Bourdon Attention Test, was used. Before Burdon attention test was started, a brief information about the test was given to the children who formed the study group. Attention levels of the individuals are measured with Burdon Attention Test. This test can be applied to individuals whose age range is 9-20. In the test, the individuals who participated in the research are given letters that are randomly set on a page. These letters are set in a specific order on the page and there are 660 letters on each page. In an experimental page, there are 31 letters "a", 29 letters "g", 30 letters "b" and 29 letters "d". Individuals participating in the study are given 5 minutes for each section. Individuals who are participating to the research are said to underline the letters a, b, d and g on the page in front of them and mark only one letter when passing through a line. However, participants have to underline all the letters a, b, d and g on the page. This situation is reminded to the participant before the test. After the test is completed, the test is evaluated by counting the lines (Yarımkaya et al., 2015). In the evaluation of the test, the correct answers given by the participants are taken into consideration and each correct answer is recorded as one point (Bozan & Akay, 2012).

Statistical Analysis

SPSS 22.0 program was used in the analysis of the obtained data. Before analyzing the data on the Burdon Caution Test according to demographic variables, the normal distribution suitability was examined with the One Sample Kolmogorov-Smirnov test. At the end of the test, it was determined that the data on the Burdon Caution Test showed no normal distribution. For this reason, non-parametric analysis methods were used to compare the data of Burdon Caution Test according to demographic variables. The Mann-Whitney U test was used to compare the data for the Burdon Attention Test for those with two sub-variables in the demographic variables (e.g. gender, male-female). In Mann Whitney U test, the significance level was determined as $p < 0.05$.

FINDINGS

Table 1

Comparison of Participants' Attention Levels with Mann Whitney U-test According to Sporting Situations

Sporting situation	N	Order Avg.	Order total	U	P
Non-sports	98	69.96	6856	2005	.001
Play sports	135	151.15	20405		

Attention skills according to sport playing level of hearing impaired individuals were compared with Mann Whitney-U test. When the table1 is scrutinized, it is seen that the attention level of those who play sport (SO =151.15) are significantly higher than those who do not sports (SO= 69.96) ($p < .05$).

Table 2

Comparison of Attention Levels of Non-Sports Participants with Mann Whitney-U Test According to Gender

Gender	N	Order Avg.	Order Total	U	P
Female	41	52.29	2144	1054	.408
Male	57	47.49	2707		

Attention levels according to the gender of the participants who do not play sport were compared with Mann Whitney-U test. When looked at the values of Females (SO= 52.29) and Males (SO=47.49), it was determined that there was no statistically significant difference between genders (p>0.05).

Table 3
Comparison of Attention Levels of Participants Who Do Sports with Mann Whitney-U Test According to Gender

Gender	N	Order Avg.	Order Total	U	P
Female	43	80.59	3465.5	1436.5	.010
Male	92	62.11	5714.5		

Attention levels of participants who do sports compared with Mann Whitney-U Test according to their gender. When the table is examined, it is observed that the attentional level of female participants (SO= 80.59) is significantly higher than male participants (SO= 62.11) (p <0.05).

DISCUSSION and CONCLUSION

When the attention levels of the students participating in the research is compared according to their sporting status, it is concluded that the attention levels of the hearing-impaired individuals who play sports are significantly higher than the hearing-impaired individuals who do not play sport. It is thought that the benefits of participating to sport have positive effects on attention levels. The result of this conclusion can be thought to be due to the positive benefits of involvement in sports. According to Asan (2011: 38), children's participation in the sport improves attention as well as concentration skills. According to Bakır & Aydoğan (2011), disabled individuals' participation in sport contributes to increase work efficiency and increase nerve-muscle activation when compared to sedentary individuals of the same age group. Empirical research findings in the literature also show that participation in sport influences attention development positively (Tunç, 2013, Adsız, 2010).

When the attention levels of the students who do not play sports were compared according to the gender variable, it was concluded that the attention level of both male and female participants are at similar level. In this context, it was concluded that gender is not a significant determinant of attention level in hearing-impaired individuals who do not play sports. In the research carried out by Karaduman (2004), it was found that the gender variable does not have a significant effect on attention skill. On the other hand, it has been found out in this research that gender is an important determinant for attention level in hearing impaired individuals. According to the findings, it was determined that the attention levels of female participants who play sports are significantly higher than male participants

As it is known, attention development is affected from some biolgical and physiological development units besides psycho- social development features (Asan, 2011). In this context, it can be considered that the level of attentiveness of the sedentary hearing impaired people does not differ according to the sex, due to the fact that both sexes are grown in similar social environments. The reason why the attention levels of hearing impaired individuals who do sport became in favor of female participants is because when compared to male participants, female participants involve in sport activities more often. In the study carried out by Rueda et. al. (2005), it was stated that the education provided by the society has a crucial role on the attention development of children.

As a result, when the findings obtained from the research were evaluated, it was determined that attention is high in favor of hearing impaired individuals with sports habits. Depending on the findings of the research and similar research findings in the literature, it can be concluded that participation in the sports is beneficial for the development of attention skills in hearing impaired individuals.

Acknowledgement: This study presented at 10 th International Physical Education, Sports and Physical Therapy Congress (ICPESPT2016) in November 18th-20th, 2016 in Fırat University, Elazığ, Turkey

REFERENCES

Adsız, E. (2010). *Investigation of the effects of regularly observed sports on students in the elementary school age*. (Unpublished master's thesis). Ege University, İzmir.

Agrawal, Y., Platz, E. A., & Niparko, J. K. (2008). Prevalence of hearing loss and differences by demographic characteristics Among US adults data from the national health and nutrition examination survey, 1999-2004. *Archives of Internal Medicine, 168*(14), 1522-1530.

Asan, R. (2011). *The effect of eight weeks of table tennis exercise on the attention of children aged 9-13*. (Unpublished master's thesis). Selçuk University, Konya.

Bakır, S., & Aydoğan, H. (2011). Comparison of Simple Auditory Reaction Times between 12–14 Aged Football Players of Gençlerbirliği FC and Visually Impaired Students Who Are Involved in Sports and Sedentary. *Selcuk University Journal of Physical Education and Sports Science, 3* (special issue), 151-160.

Bozan, A.Y. (2012). The Effect of Attentıon Improvement Traınıng on The Prımary School 5th Grade Students' Skılls of Gatherıng Attentıon. *Western Anatolia Educational Science Journal, 3*(6), 53-66.

Brickenkamp, R., Bleck,I., Dzida, W., Heinrich, P., Hellwig, H.J., Krüger- Naumann, R., Rothe, R., Speck, D., Speck, R., & Thiede, L. (1975). *Handbuch psychologischer und paedagogischertests*. Göttingen: Verlag für Psychologie.

Can, A. (2014). *Quantitative data analysis in scientific research process with SPSS*. (2. eds). Ankara: Pegem Academy

Çoban, B., & Ünveren, A. (2007). *Physical education and game teaching*. Oğuzhan Zirek (Ed.). Ankara: Nobel Publication Distribution.

Demirbilek, M. (2013). The needs of mentally handicapped individuals and their families. *Turkish Journal of Family Medicine and Primary Care, 7*(3), 58-64.

De Moor, M. H. M., Beem, A. L., Stubbe, J. H., Boomsma, D. I., & De Geus, E. J. C. (2006). Regular exercise, anxiety, depression and personality: a Population-Based Study. *Preventive Medicine, 42*(4), 273-279.

Dereceli, Ç. (2011). *Investigating the effect of primary level I students with attention deficit and hyperactivity impairment on internal and external audit focus and attention levels in the Tai-Chi program*. (Unpublished doctorate thesis). Ege University, İzmir.

Karaduman, B.D. (2004). *The effect of attention traınıng program on fourth and fifth grade prımary school students'attention, self concept and achıevement levels*. (Unpublished doctorate thesis). Ankara University, Ankara.

Kaymak, S. (2003). *Improvıng The Concentratıon Skıll of Chıldren Attendıng The Second and Thırd Classes of a Prımary School*. (Unpublished doctorate thesis). Ankara University, Ankara.

T.C. Ministry of Education. (2010). *Why and how to ıntegrate our schools manager, teacher and family guide*. Ankara: General Directorate of Special Education Guidance and Counseling Services.

Öztürk, M. (2011). *The fact of disabled in Turkey*. Istanbul: MUSIAD Pocket Books.

Rueda, M.R, Rothbart, M.K, McCandliss, B.D, Saccomanno, L, & Posner, M.I. (2005). Training, maturation, and genetic influences on the development of executive attention. *Proceedings of the national Academy of Sciences of the United States of America, 102*(41), 14931-14936

Ströhle, A. (2009). Physical activity, exercise, depression and anxiety disorders. *Journal of Neural Transmission, 116*, 777-784.

Subaşıoğlu, F. (2008). A research on "disability awareness" of information and document management departments of universities. *The world of knowledge, 9*(2), 399-430.

Şahin, M., Yetim, A. Z., & Çelik, A. (2012). Physıcal Actıvıty and Sport as a Preventıve Factor ın Buıldıng Resılıence. *The Journal of Academic Social Science Studies, 5*(8), 373-380.

Şenyüzlü, E. (2013). *Analysis of the Effects of Sports Participation on Aggressive Behaviour Among University Students*. (Unpublished master's thesis). Dumlupınar University, Kütahya.

Taşkın, R. (2014). No obstructions in sports. *2nd Internatıonal Physıcal Educatıon and Sports Congress for The Dısabled*, (p. 43-45), Batman.

Tunç, A. (2013). *An investigation of attention levels of golf sports children*. (Unpublished master's thesis). Selçuk University, Konya

Yarımkaya, E., Akandere, M., & Topal, A. (2015). The effect of sprint training on children's attention. *International Referee Sports Journal of Health and Medical Sciences, 5*(14), 83-95.

Yetim, A.A. (2014). Sociological approach to disability sports. *2nd Internatıonal Physıcal Educatıon and Sports Congress for The Dısabled*, (p. 3-9), Batman.

TÜRKÇE GENİŞLETİLMİŞ ÖZET

Yapılan bu araştırmada, spor yapan işitme engelli çocuklar ile spor yapmayan işitme engelli çocukların dikkat becerilerinin bazı değişkenlere göre karşılaştırılması amaçlanmıştır. Araştırmaya Malatya, Elazığ, Gaziantep ve İstanbul illerinde ikamet etmekte olan, düzenli olarak spor yapan 135 ve düzenli olarak spor yapma alışkanlığı bulunmayan 98 çocuk olmak üzere toplam 233 işitme engelli birey katılmıştır. Araştırmaya katılan işitme engelli bireylerin, ikamet ettikleri illere göre dağılımları değerlendirildiği zaman, araştırmaya Malatya ilinden spor yapan 17, spor yapmayan 9 çocuk, Elazığ ilinden spor yapan 21, spor yapmayan 14 çocuk, Gaziantep ilinden spor yapan 23, spor yapmayan 26 çocuk, İstanbul ilinden ise spor yapan 74, spor yapmayan 49 çocuk katıldığı belirlenmiştir. Cinsiyetlerine göre dağılımları değerlendirildiği zaman, spor yapan işitme engelli çocukların 92'sinin erkek, 43'ünün kız olduğu, spor yapmayan işitme engelli çocukların ise 41'inin kız, 57'sinin ise erkek olduğu tespit edilmiştir.

Araştırmanın veri toplama aşamasında iki bölümden oluşan anket kullanılmıştır. Kullanılan anketin birinci bölümünde, katılımcıların demografik özelliklerini belirlemeyi amaçlayan kişisel bilgi formu yer almaktadır. Araştırmaya katılan işitme engelli çocukların sahip oldukları demografik özelliklerin belirlenmesinde kullanılan kişisel bilgi formu, uzman görüşü alınarak hazırlanmıştır. Veri toplama anketinin ikinci bölümünde ise katılımcıların dikkat becerilerini belirlemeyi amaçlayan test bulunmaktadır. Araştırmaya katılan işitme engelli çocukların dikkat becerilerinin tespit edilmesinde Bourdon Dikkat Testi kullanılmıştır. Bourdon Dikkat Testinin en son kullanılan biçimi 1955 yılında Benjamin Bourdon tarafından geliştirilmiş olup test iki formdan meydana gelmektedir. Bu formlardan birincisi belli harfleri karışık harfler arasında bulup işaretleme şeklinde uygulanmaktadır. İkinci form ise bazı figür ve şekillerin karışık figür ve şekiller arasından bulunup işaretlenmesi şeklinde gerçekleştirilmektedir (Brickenkamp, 1975; Aktaran: Kaymak, 2003). Yapılan bu araştırmada Bourdon Dikkat Testi'nin birinci formu olan harf bulma yönteminden yararlanılmıştır. Bourdon dikkat testine başlamadan önce, araştırma grubunu oluşturan çocuklara test hakkında kısa bilgi verilmiştir. Bourdon Dikkat Testi ile bireylerin dikkat düzeyleri ölçülmektedir. Bu test yaş aralığı 9-20 arasında bulunan bireylere uygulanabilmektedir. Testte araştırmaya katılan bireylere bir sayfa üzerinde gelişi güzel dizilmiş olan harfler verilmektedir. Bu harfler sayfa üzerinde belirli bir sıra ile dizilmiş olup her sayfada toplam 660 harf yer almaktadır. Deneme amaçlı olarak hazırlanan bir sayfada 31 tane "a" harfi, 29 tane "g" harfi, 30 tane "b" harfi ve 29 tane "d" harfi yer almaktadır. Testte araştırmaya katılan bireylere her bölüm için 5 dakika süre verilmektedir. Araştırmaya katılan bireylere bu süre içerisinde, önlerinde bulunan sayfada yer alan a, b, d ve g harflerinin altlarını kurşun kalem ile çizmeleri ve bir satısı gözden geçirirken sadece bir harfi işaretlemeleri gerektiği söylenmektedir. Ancak; katılımcılar mutlaka sayfada yer alan tüm a, b, d ve g harflerinin altını çizmek zorundadırlar. Bu durum, katılımcılara test öncesinde hatırlatılmaktadır. Test tamamlandıktan sonra çizgiler sayılarak testin değerlendirmesi yapılmaktadır (Yarımkaya, Akandere ve Topal, 2015). Testin değerlendirilmesinde, katılımcıların verdikleri doğru cevaplar dikkate alınmakta olup verilen her bir doğru cevap bir puan olarak kaydedilmektedir (Bozan ve Akay, 2012).

Elde edilen verilerin analizinde SPSS 22.0 programı kullanılmıştır. Burdon Dikkat Testine ilişkin veriler demografik değişkenlere göre analiz edilmeden önce normal dağılıma uygunluğu One Sample Kolmogorov-Smirnov testi ile incelenmiştir. Yapılan test sonucunda Burdon Dikkat Testine ilişkin verilerin normal dağılım göstermediği tespit edilmiştir. Bu nedenle, Burdon Dikkat Testine ilişkin verilerin demografik değişkenlere göre karşılaştırılmasında non-parametrik analiz yöntemleri kullanılmıştır. Demografik değişkenlerde iki alt değişkeni olanlar için (örneğin cinsiyet kadın-erkek) Burdon Dikkat Testine ilişkin verilerin karşılaştırılmasında Mann Whitney U testi kullanılmıştır. Mann Whitney U testlerinde anlamlılık düzeyi $p < 0.05$ olarak belirlenmiştir.

Araştırmanın sonunda, spor yapma alışkanlığı bulunan işitme engelli bireylerin, dikkat becerilerinin spor yapma alışkanlığı bulunmayan (sedanter) işitme engelli bireylere kıyasla istatistiksel açıdan anlamlı düzeyde daha yüksek olduğu tespit edilmiştir. Spor yapma alışkanlığı bulunan işitme engelli çocuklar ile sedanter işitme engelli çocukların dikkat düzeyleri üzerinde bazı demografik değişkenlerin önemli birer belirleyici olduğu, buna karşılık her iki grupta da bazı demografik değişkenlerin dikkat düzeyini etkilemediği belirlenmiştir. Spor yapmayan işitme engelli çocuklarla kıyaslandığı zaman, spor yapan çocuklarda cinsiyet değişkeninin dikkat becerisini etkilediği belirlenmiştir.

Sonuç olarak, dikkat becerisinin spor yapma alışkanlığı bulunan işitme engelli bireyler lehine yüksek olduğu tespit edilmiştir. Bunun yanında, sosyo-demografik değişkenlerin spor yapma alışkanlığı bulunmayan işitme engellilerin dikkat becerileri üzerinde anlamlı etkilere sahip olduğu, buna karşılık sosyo-demografik değişkenlerin spor yapma alışkanlığı bulunan işitme engelli bireylerin dikkat becerilerini anlamlı düzeyde etkilemediği bulunmuştur. Araştırma elde edilen bulgular ve literatürde yer alan benzer araştırma bulgularına dayanılarak, işitme engelli bireylerde dikkat becerisinin geliştirilmesi için spora katılımın faydalı olacağı söylenebilir.

TURJE
www.turje.org

Volume 6 Issue 2

DOI: 10.19128/turje.287472

Turkish Journal of Education
Research Article

Received 23.01.2017
Accepted 14.06.2017

A meta analytical review of the relationship between personal epistemology and self-regulated learning

Muhammet Mustafa Alpaslan
Muğla Sıtkı Koçman University, Faculty of Education, Muğla, Turkey, mustafaalpaslan@mu.edu.tr
Buğrahan Yalvac
Texas A&M University, Department of Teaching, Learning and Culture, TX, USA, yalvac@tamu.edu
Victor Willson
Texas A&M University, Department of Teaching, Learning and Culture, TX, USA, v-willson@tamu.edu

ABSTRACT Recently, researchers have begun associating personal epistemology with self-regulated learning. Therefore, in the literature there is a need to examine what degree the studies have supported the relationship between the two. The purpose of this meta-analysis is two folds: a) to compute the mean effect size for the relations between personal epistemology and self-regulated learning and b) to examine the influence of moderator variables including age, gender, culture, and subject area on the mean effect size. It analyzes the result of forty-five studies conducted various countries and disciplines. A small but significant mean effect size emerged (r=.24 [SE=.012] under fixed effects model, and r=.22 [SE=.026] under random effects model). Although the effect of age on the relationship is not statistically significant, moderator analyses revealed statistically significant effects of the culture, gender, and subject area inferred from the reviewed studies on the relationship. The results highlight the need for further research into how gender, culture and subject area influence students' personal epistemology and self-regulated learning

Keywords *Culture, Gender, Meta-analysis, Personal epistemology, Self-regulated learning.*

Epistemolojik inançlar ve öz-düzenleyici öğrenme: Bir meta-analitik inceleme

ÖZ Son yıllarda araştırmacılar epistemolojik inançları öz-düzenleyici öğrenme stratejileri ile ilişkilendirmeye başlamıştır. Dolayısıyla epistemolojik inançlar ile öz-düzenleyici öğrenme stratejileri arasındaki ilişkinin alan yazında yapılan çalışmalarla nasıl desteklendiğine dair bir derleme (meta-analiz) çalışmasına ihtiyaç vardır. Bu meta-analiz çalışmasının iki amacı vardır: a) epistemolojik inançlar ile öz-düzenleyici stratejiler arasındaki ilişki için ortalama etki büyüklüğü hesaplamak ve b) hesaplanan etki büyüklüğüne yaş, cinsiyet, kültür ve konu alanı gibi moderatör değişkenlerin etkisini incelemektir. Bu amaçla farklı ülkelerde ve konu alanlarında yapılmış olan toplam 45 çalışma (40 makale) incelenmiştir. Analiz sonucunda küçük fakat anlamlı bir ortalama etki büyüklüğü hesaplanmıştır (sabit etki modeli altında, r=.24 [SE=.012] ve rasgele etki modeli altında r=.22 [SE=.026]). İki değişken arasındaki ilişki farklı okul seviyesinde yapılan çalışmalar arasında değişmemesine rağmen, hesaplanan etki büyüklüğünün kültür, cinsiyet ve konu alanı değişkenlerine göre anlamlı düzeyde farklılık gösterdiği bulunmuştur. Elde edilen sonuçlar cinsiyetin, kültürün ve konu alanının epistemolojik inançlar ile öz-düzenleyici stratejiler arasındaki ilişkiyi nasıl etkilediğini açıklayan teorik modellere ve çalışmalara ihtiyaç olduğunu göstermiştir.

Anahtar Kelimeler *Kültür, Cinsiyet, Meta-analiz, Epistemolojik inançlar, Öz-düzenleyici stratejiler.*

INTRODUCTION

Over last decades' views on how learning occurs have shifted from simple conditioning to complex networks of interacting factors. Nowadays, many educators view education as a hot rather than a cold process which learners construct their own ways and with their prior experiences, and theories that shape how knowledge is formed (Phillips, 1995; Sinatra, 2005: Zimmerman, 2008). As a consequence of this transition, two particular constructs, personal epistemology and self-regulated learning, have drawn the attention of many researchers.

Personal epistemology and self-regulated learning play important roles in learning. Personal epistemologies refer to students' views on knowledge and knowing (Hofer & Pintrich, 1997). There is growing evidence that personal epistemology affects students' motivation (Buehl, & Alexander, 2005), implicit theories (Chen, 2012), text comprehension (Bråten, Ferguson, Strømsø, & Anmarkrud, 2013) and self-regulation (Braten & Stromso, 2005). In the review of personal epistemology and multiple-text comprehension, Ferguson (2015) supported the notion that students' ideas about knowledge and knowing are linked with their multiple-text comprehension, and should be included in any model of text comprehension. Self-regulated learning is defined as a process in which individual students actively monitor and control their own motivation, cognition, and behavior toward the successful completion of academic tasks (Pintrich, 2002; Zimmerman, 2008). Self-regulated learners are those "who monitor their own process towards self-set goals and are therefore able to reflect on the effectiveness of their learning approaches, tent to view the learning tasks as intrinsically interesting and worthwhile while having high levels of self-efficacy, and engage in and persist with learning behaviors that maximize the degree to which learning occurs" (Crede & Phillips, 2011, p. 337). Thus, research on personal epistemology and self-regulation can help us understand the complex structure of learning.

Recently, researchers have begun associating personal epistemology with self-regulated learning. Some researchers (e.g., Hofer & Pintrich, 1997) stated that personal epistemology served as goals that guide self-regulated learning. Other researchers (Bromme, Pieschl, Stahl, 2010; Muis, 2007) pointed out that personal epistemology is likely to shape learner's perceptions of tasks and therefore how the tasks are approached. Although the theoretical models exist to explain how personal epistemology associates with self-regulated learning, it is important to know how empirical studies support the relationship between personal epistemology and self-regulated learning. A meta-analysis is a statistical summary of relavant literature taht reveals how strong the correlation is by computing the mean effect size of the relationship under investaigation (Sen & Akbas, 2016). Therefore, we believe that taking a closer look at the strength of the relationship between personal epistemology and self-regulated learning may better guide the future studies. Moreover, a meta-analysis can enable us to explain the variation by including the moderator effects, such as, culture, sex, age, and subject area that underpin the theories of personal epistemology and self-regulated learning (e. g., Hofer, 2008; Zimmerman, 2008). For example, Hofer (2008) states that research in the relationship between personal epistemology and self-regulated learning may not neatly replicate in other cultures. Including the studies conducted in different cultures, the meta-analysis results can enable us to determine the level of difference among the cultures. Furthermore, a recent discussion in personal epistemology research whether personal epistemology is the domain- or general-specific (Muis, Bendixen, & Haerle, 2006; Topcu, 2013). Therefore, it may be helpful to examine its domain-specificity by comparing reported effect sizes in the different domains. In the literature, no meta-analytic study dealing with personal epistemology and self-regulated learning has been reported up to date. The present study addresses this gap.

Personal epistemology expresses individuals' ideas about how knowledge is generated, evaluated and costructed. Research into personal epistemology began with Perry's (1970) longitual study with college students. Since Perry's work, many attempts have been done to organize personal epistemology research. The complexity of personal epistemology research led to many different perspectives on how to organize the research. These models can be put into two groups as (a) the developmental nature of epistemic thinking (Kuhn, 1991; Perry, 1970), and (b) multi-dimensional structure of personal epistemology (Greene, Azevedo and Torney-Purta, 2008; Hammer & Elby, 2002; Hofer & Pintrich, 1997; Schommer, 1990).

In the developmental nature of epistemic thinking models, personal epistemology is viewed as worldviews (e.g., dualist, relativist). This perspective suggests that personal epistemology is a cognitive construct that progresses along a predictable developmental path, driven by a process of cognitive

equilibrium (Feucht & Bendixen, 2010; Hofer & Pintrich, 1997). In this perspective, personal epistemology develops through three or more general stages (e.g., absolutist, subjectivist, evaluativist; Schraw, Brownlee, & Berthelsen, 2010). Perry (1970), for example, characterized students' theories about the nature of knowledge with nine positions clustered in four categories: dualism, multiplicity, relativism, and commitment. In this perspective, common views are that naïve individuals tend to see knowledge as static and an accumulation of separate facts. If any change in one's personal epistemology occurs- it has to move from naïve views through more sophisticated views.

Models in the multi-dimensional structure of personal epistemology view personal epistemology as a construct that consists of different dimensions, rather than unitary. In this perspective, individuals may have different beliefs about the different facets of knowledge and knowing. Schommer (1990), for example, conceptualized individuals' personal epistemology as a system of several independent beliefs about learning and knowledge in five belief dimensions: (a) the structure of knowledge that knowledge is organized ranging from simple to complex, (b) the stability of knowledge, ranging from absolute to tentative, (c) the source of knowledge that knowledge is handed down by authority to reasoning and observation, (d) the ability to learn, ranging from fixed at birth to improvable learning, and (e) the speed of learning, ranging from quick to not-at-all learning. In another model of the multi-dimensional structure of personal epistemology, Hofer and Pintrich (1997) conceptualized personal epistemology as epistemic theories in four identifiable dimensions as the certainty of knowledge, the simplicity of knowledge, the justification of knowledge and the source of knowledge. Research has reported that students' ideas about knowledge and knowing are important to understand how learning occurs. For example, beliefs in the speed of learning related to students' problem solving in well-structured content (Schraw, Dunkle, & Bendixen, 1995). Also, students who believe that knowledge is fluid are more likely to change their conceptions about scientific phenomena (Nussbaum, 2011). Naive students are less willing to use and evaluate evidence on justifying knowledge claims, and rely on the authority (Sandoval & Cam, 2011).

Like personal epistemology, many models have been made to organize self-regulated learning research (e.g., Pintrich, 2002; Winne & Hadwin, 1998; Zimmerman, 2000). Although terminology varies from one model to another, models of self-regulated learning typically have four phases or processes: (a) forethought (Zimmerman, 2000), the definition of the task (Winne & Hadwin, 1998), and the goal orientation (Pintrich, 2002), (b) monitoring, (c) control, and (d) reaction and reflection (Muis, 2007). In the first phase, the learner may set up goals for learning tasks. In the second phase, metacognitive awareness of various aspects of the learning process is activated. In the third phase, controlling processes and regulating learning are activated. In the fourth phase, the learner may show various types of reflections and reactions about the learning event (Muis, 2007).

Winne and Hadwin (1998), for example, conceptualized self-regulated learning in four phases: task definition, goal setting and planning, enactment, and adaptation to metacognition. Winne and Hadwin defined each of four phases based on the interaction of the student's conditions, operations, products, evaluations, and standards (COPES). The task definition is the phase which the student produces perceptions of what the task is. The second phase, the goal-setting and planning, is which she or he produces goals for the task based on the task definition. It is third phase, the enactment phase, which the student go through the plan of study and tactics created in the goal-setting phase. In the last phase, the adaptation, the student may reflect and adapt the learning based on experience of the task. Research has documented the importance of students' self-regulated learning on their learning in general and consequently their academic achievement (Bandura, 1997; Pintrich & De Groot, 1990). Student with high self-regulated learning have demonstrated higher levels of involvement, effort, and consistency on academic tasks than those who were low self-regulated learning, and as a result of it, a higher level of achievement on their subject areas (Eilam, Zeidner & Aharon, 2009; Zimmerman & Pons, 1986).

Personal epistemology can influence students' thinking and learning in many ways including directing their perception and attention to particular features of information, guiding the processing, and the use of information (Pintrich, 2002). Personal epistemology serves as inputs to metacognitive processes and as standards in the task definition phase of self-regulation (Muis, 2007). Moreover, Hofer (2004) conceptualizes personal epistemology as a part of metacognition which is a required condition for self-regulated learning. She assumes that, for example, whether naïve or sophisticated belief about the source and justification of knowledge requires different learning strategies. On the one hand, a naive learner relies on only one source such as textbooks; a sophisticated learner tends to look for different sources,

monitor to epistemic claims, weighting evidence, and evaluate authorities, on the other hand. In the same view, she exemplifies that holding a naïve belief about the certainty and simplicity of knowledge leads the learner to look for simple answer for the given task: however, a sophisticated learner engages in deep learning process and critical thinking to complete the given task.

Some researchers have proposed theoretical models to explain the relationship between personal epistemology and self-regulated learning. Muis (2007), for example, conceptualized a framework to describe how personal epistemology can facilitate or limit facets of self-regulates learning. Based on a combination of various models of self-regulated learning, she purposes four phases for self-regulated learning: (a) cognition that refers to knowledge activation and knowledge tactics and strategies, (b) motivation and affect that refer to achievement goals and self-efficacy, (c) behavior that refers to effort and time, and (d) content that includes resources and social content. Based on the facets of self-regulated learning, she specifies four positions for the relation between personal epistemology and self-regulated learning: (a) personal epistemology is one component of the cognitive and affective conditions on task definition, (b) personal epistemology influences goals standards students set, (c) personal epistemology translate into epistemic standards that serve as inputs to metacognition, and (d) self-regulated learning may play a role in the development of personal epistemology. She posits that as the reciprocal relationship is in the nature of the model, any information from any phase or component can provide information back into other components. Researchers has reported that students' beliefs about knowledge and knowing are related to their self-regulated learning. More sophisticated personal epistemology was related to stronger adaptation to task complexity and students with sophisticated personal epistemology shown stronger relations between their judgments and task complexity (Bromme et al., 2010). In addition, student beliefs with more sophisticated personal epistemology reported to have higher indicators of deep processing learning strategies (Bromme et al., 2010).

Researchers have been interested in the role of individuals' beliefs in their learning processes. Studies focusing on personal epistemology and self-regulated learning have assumed that both are closely linked to each other (Hofer, 2004; Pintrich, 2002). These studies have consistently demonstrated statistically significant relationships between the students' personal epistemologies and self-regulated learning. In the present study, we wanted to examine the relationship between the personal epistemologies and self-regulated learning from the primary school level through college level, and how this relationship is differentiated by moderator variables (e.g., culture, age, subject area, and sex). A meta-analytic review of studies concerning personal epistemology and self-regulated learning help us know the overall effect size the studies have reported.

Potential moderator effects

We have identified several potential moderator variables that the previous studies have reported, relating to the relationship of personal epistemology and self-regulated learning.

Age. Younger students may have difficulties in applying cognitive and metacognitive strategies (Zimmerman, 2000). Paris and Winograd (1999) asserted that the development of children's metacognition continues during schooling from 5 to 16 years. Zimmerman and Martinez-Pons (1986), for instance, found that 11th graders reported a higher level of mathematical and verbal self-efficacy than 5th graders. Also, Hofer (2008) stated that individuals' beliefs about knowledge develop with age and education. Thus, variation in personal epistemology may be a function of age (Buehl, 2008). For example, Driver et al. (1996) studied scientific views of students aged 9, 12, and 16 and found that younger students reported naïve beliefs than did older students.

Culture. Studies identified that the structure of Asian students' beliefs is different from the students sampled from the U.S. (Hofer, 2008). As cultural norms play a crucial role on an individual's construction of his/her own personal epistemology, studies that sampled participants in different countries may report the different level of relationship (Hofer, 2008). Moreover, different educational systems affect the personal epistemology and self-regulated learning, and consequently the relationship between the two. For instance, Purdie, Hattie, and Douglas (1996) found that Australian students reported greater use of self-regulated learning strategies than Japanese students.

Sex. Sex appears to play a role in personal epistemology and self-regulated learning. For instance, Neber and Schommer-Aikins (2002) found that highly gifted girls' science-related motivational beliefs were less positive than those of boys. Similarly, Elder (2002) found that girls showed more sophisticated beliefs in the source of knowledge than did boys.

Subject area. Students may hold different personal epistemologies about hard versus soft sciences (Buehl & Alexander, 2005). For example, Hofer (2000) found that students viewed scientific knowledge to be more certain than knowledge in the discipline of psychology. Students' learning strategies may differ from one course to another (Pintrich, 1995). Wolters and Pintrich (1998) found that 7th and 8th grade students reported greater use of cognitive strategies in social studies than in mathematics.

Research questions

Considering the moderator effects described above, two guiding research questions were posed to analyze the relationship between personal epistemology and self-regulated learning:

What is the overall effect size of the studies that have been conducted to determine the level of relationship between personal epistemology and self-regulated learning?

How do moderator variables including sex, country, subject area, and grade affect the level of relationship?

METHODOLOGY

List of Variables

Personal epistemology and self-regulated learning strategies are the variables in this study. We used any study dealing with personal epistemology from both developmental and multi-dimensional perspectives. For self-regulation learning strategies, the literature provides a large number of strategies, ranging from simple reading to more advanced strategies including synthesizing knowledge. To be consistent with the previous meta-analytic studies in self-regulated learning (e.g., Dignath and Buttner, 2008; Dignath, Buttner & Langfelt, 2008), we focus on the following self-regulated learning strategies:

Motivational strategies. These strategies refer to motivational aspect of using cognitive and metacognitive strategies including goal orientation, task value, control beliefs, self-efficacy, and test anxiety (Dignath et al., 2008; Pintrich, 1995).

Cognitive strategies. Cognitive strategies are defined as the treatment of the learned information. Cognitive strategies including elaboration, rehearsal, and organization are domain and task specific (Pintrich et al., 1991).

Metacognitive strategies. These are strategies a higher level than the cognitive strategies. Meta-cognitive strategies refer to cognition about cognition. These strategies include self-reflection, planning, and monitoring (Winne & Hadwin, 1998).

Management Strategies. Management strategies are used to enhance the learning environment and to create the optimal learning conditions. These strategies include help-seeking, collaborative learning, and effort management (Pintrich et al., 1991).

Data Collection

We identified potential data sources via keyword searches of the PsychINFO, Eric, Dissertation Abstracts databases, Google Scholar and examinations of the reference lists of studies. Sixteen words describing personal epistemology and self-regulated learning were used: *personal epistemology, epistemic belief, epistemological beliefs, beliefs, meta-cognition, learning strategies, self-regulation, self-monitoring, help-seeking, goal orientation, self-efficacy, cognition, task value, peer learning, effort management, and test anxiety.*

Coding procedure. We coded each data source using standardized coding sheets. This information includes: correlations between personal epistemology and self-regulated learning, and sub-scales, reliability values of the instruments, the type of subject area (e.g., Chemistry), and sample characteristics including sex, country, and age. To address the coding reliability, several steps were followed as highlighted by Lipsey and Wilson (2001). The first author of the study coded all studies. After some time passed, the first author coded all studies again. Results from these condings were compared item by item (Lipsey & Wilson, 2001). Second, an independent expert coded some sample of data (Yeaton Wortman, 1993). Intercoder reliability was %95. Disgreements were solved by discussion.

Selection criteria. We used several criteria to include potential studies in this meta-analytic study.

Purpose of the study. We included studies that focused on the relationship between personal epistemology and self-regulated learning, and, if that relationship is shown to exist, what influence the relationship had on achievement. We excluded interventional studies that were outside the scope of the study. Studies that focused on only one dimension of personal epistemology and self-regulated learning were included.

Reporting. Studies were included if the inter-correlation among subscales could be computed. Any study was excluded if the inter-correlation among subscales cannot be calculated into Pearson correlation. We also excluded studies that did not report any subscale or reported only statistically significant correlation, not all correlations.
Publication type. Since it is difficult to obtain unpublished papers, only studies published in English in peer-reviewed journals and as ERIC document (conference papers) were included in the study.
Time scope. Studies that were conducted between 1997 and 2013 years were included in the study.

Data Analysis Methods

Computing effect size. Personal epistemology and self-regulated learning is a multivariable construct, which was in most cases measured by several constructs. In terms of personal epistemology, studies employed different theoretical models whose dimensions do not overlap each other. To be able to investigate the relation between personal epistemology and self-regulated learning, we followed these steps: First, Pearson r-values were transferred to Fisher's z score. Then, for each self-regulated learning strategy, we computed the average value of the Fisher's z score (Corey, Dunlap, & Burke, 1998). That yielded an average z score of the correlation between the self-regulated learning strategy and personal epistemology. Next, Fisher's z scores were transferred back to Pearson r. Finally, self-regulated learning strategies were grouped according to the recorded dimension. As for the reliabilities, if the studies that did not report overall reliabilities of measurements, we computed it, as described by Willson (1982), by using reliabilities of each subscale and inter-correlation between each subscale in unweighted case of the number of item.

To compute effect size, we used Pearson correlation within variables. In case the studies do not report overall Pearson correlation, we calculated the average correlations following the steps described above, if inter-correlation among the subscales of variables was reported. We calculated the effect size for the studies that regressed variables, as described by Libsey and Wilson (2001). To make corrected effect size, we included the reliabilities of variables into the calculation. If a study did not report its measurements' reliability values, we used the mean value of reliabilities computed by other studies, which reported reliabilities as described by Hunter and Schmidt (2004). When aggregating the effect sizes across the studies, we weighed the effect sizes of the studies by the number of participants, as the effect sizes from studies with different sample sizes do not estimate the level of relationship with the same precision (Dignath & Buettner, 2008). All computation was done by using Excel 2010 data sheet that allowed us to compute the effect sizes by using formulas as described by Libsey and Wilson (2001).
Fixed-and random-effects models. In literature, meta-analysis studies use fixed or random effects models. Fixed effects model refers to the assumption that sampling error is due solely to differences among participants in the study on the one hand (Cooper, 2010). On the other hand, random effects model views "studies as containing other random influences, including differences in teachers, facilities, community economics, and so on" (Cooper, Robinson, & Patall, 2006, p.16). Rather than choosing a single effect model, we chose to apply both effects models to our analysis. We conducted all analyses twice, under fixed and random effects models once. By doing so, we could examine the effects of different models on the outcomes of the analysis and make our interpretation on the effect of moderator variables in the effect size distribution (Cooper et al., 2006).
We used multiple ANOVAs to examine the interaction of categorical moderator variables (e.g., grade level) on the relationship, and regression analysis for continuous moderator variables. We put studies into groups as the following criteria:
Age. Most studies did not report age means. Thus, we categorized studies by the level that studies targeted such as, university, high school (9th to 12th grade), and elementary (1st to 8th grade).
Culture. We used the country of origin of the study as indicator of the culture. Since studies were conducted in different countries, we categorized the studies into two groups: (a) Western culture (countries in Europe, Australia, and North America) and Eastern Culture (countries in Asia).
Sex. We used the percentage of the female participants in the study. By doing so, we obtained a continuous variable.
Subject area. Biglan (1973) classified academic disciplines into two groups as hard science and soft science. Based on Biglan's (1973) classification of academic disciplines, we categorized students' majors into three groups as: (a) hard sciences including physics, science, and math etc., (b) soft sciences

including education, psychology, history etc., and (c) mixed sciences indicating participants' majors in both hard and soft sciences. We categorized studies at high school and elementary levels into the mixed sciences unless the study focused on the particular subject area. Some studies focused on elementary students' scientific beliefs or science-related strategies (e.g., Chen, 2012). We put these studies into the hard science group, not mixed group.

RESULTS

General Characteristics of the Studies Included in the Meta-analysis

A total of forty-five studies from forty articles, which met the eligibility criteria, were included in the meta-analysis. These sampled studies were drawn from a variety of student populations from elementary level through college level. The samples were drawn from 15 countries: The United States, Canada, Norway, Hong Kong, Taiwan, Germany, Turkey, China, Fiji, Italia, Belgium, India, Indonesia, Iran, and Greece. Of these studies, %47.6 in North America, %16.6 in Europe, and 35.7 in Asia, and %2.3 in Australia were conducted. The mean age of participants was 17.9 years. Fifty-nine percent of the participants was female.

One hundred and thirty effect sizes arose from these 45 studies resulting from 40 articles. Dignath et al. (2008) discussed that an effect size value that differs greatly from the distribution of all effect sizes may be misleading the results in the research area and it influences the meta-analytic analysis in a spurious way. Lipsey and Wilson (2001) recommended excluding such an extreme effect size in the analysis if it differs from the mean effect size more than three standard deviations. We looked at the funnel plot of the effect sizes and located an extreme effect size (with an E.S. value of .66). We excluded this effect size (with a value of .66) from the analysis. Figure 1 represents the funnel plot of the effect size illustrating the distribution of the effect sizes before the elimination.

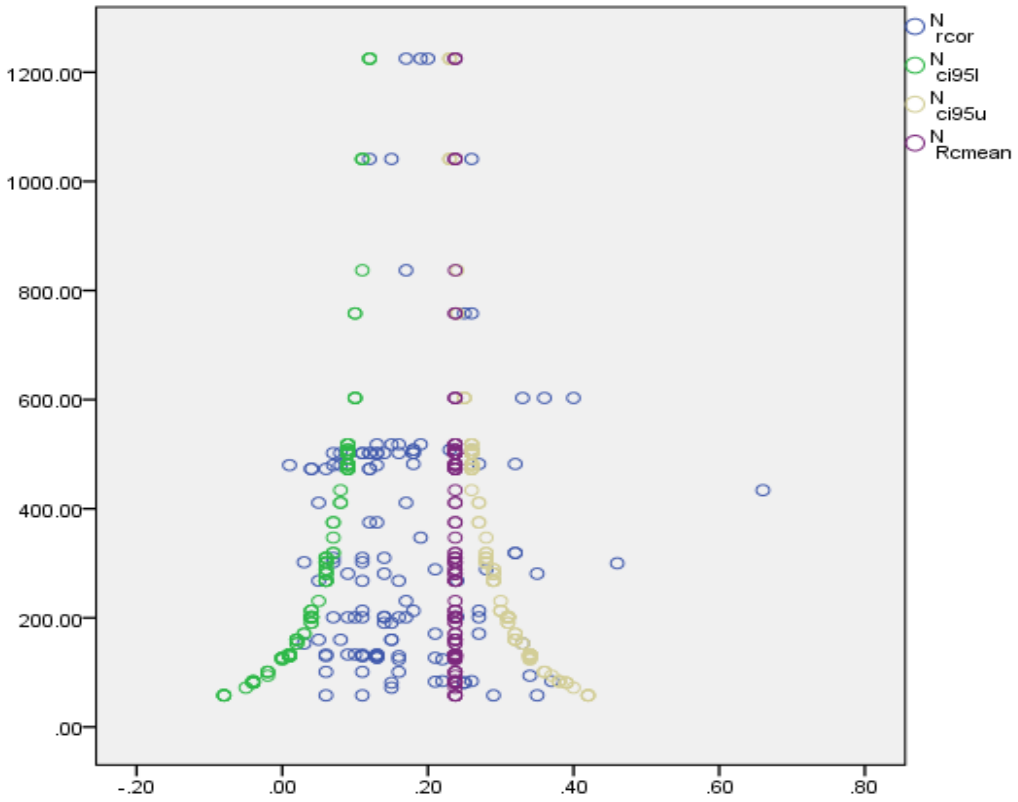


Figure 1

The funnel plot of the effect sizes. X-axis represents the value of effect size and y-axis represents the number of the participant.

After eliminating the extreme effect size, the overall distribution comprised 129 effect sizes. Of these effect sizes, 22 cognitive strategies effect sizes, 17 meta-cognitive strategies effect sizes, 12 management

strategies effect sizes were reported (See Table 1). Most effect sizes focused on the relation between personal epistemology and motivation strategies. Fourteen studies reported the overall effect size.

Table 1
Summary of Study and Effect Size Characteristics

Self-regulated learning strategies	n=129 (effect size)	N= 45 (studies)
Cognitive strategies	22	13
Meta-cognitive strategies	17	15
Motivational strategies	64	24
Management strategies	12	7
Overall strategies	14	14
Sample size	M= 342.70 (S.D.=250.53)	

Mean effect sizes were computed, underlying the assumption of fixed and random effects models. In the fixed effects model, the weighted overall effect size, "r" was .24 with a standard error .012. In the random effects model, the weighted overall effect size, "r" was .22 with a standard error .026. In the random effects model the standard error value was higher, which led the confidence intervals to be wider. Since the confidence intervals for fixed and random effects models do not include zero (Dignath et al., 2008), the mean effect sizes are statistically significant (See Table 2). In addition, we conducted the Q homogeneity test to compare the observed variance to that expected from sampling error (Cooper, 2010). We found a statistically significant difference, which indicates the heterogeneity of the effect sizes (Q (128) =635.7, p<.01). Furthermore, the I^2 value was 80% that showed the considerable heterogeneity, which might be evidence for the presence of the effects of the moderator variables in effect sizes (Borenstein, Hedges, Higgins & Rothstein, 2009).

Table 2
Mean Effect Sizes

	Mean E.S.(S.E.)	-95% CI	+95% CI
Fixed effects model	.24 (.012)	.21	.27
Random effects model	.22 (.026)	.17	.27
Random effects var. com. (v)			.016

Relationship between Moderator Variables and Effect Sizes

The influence of the aforementioned moderator variables (age, culture, subject area, and sex) on the effect size variability is presented.

Age. Age was identified as a moderator effect that may influence the level of relationship between variables. Since most studies were clustered in college level and that were not continuous within themselves by age, we categorized the sampled studies into levels as university, high school, and elementary; so that we were able to include studies that did not report the mean value of the participants' ages (See Table 3).

Table 3
Summary of Study and Effect Size Characteristics by Age

Age (grade level)	n=129 (effect size)	N= 45 (study)	Mean sample size
University	85	31	M= 311.5 (SD=193.0)
High School (9th to12th)	20	7	M= 418.5 (SD=350.6)
Elementary (1st to 8th)	24	7	M=361.5 (SD=249.8)

We computed mean effect sizes for each group, underlying the assumption of fixed effects model and random effects model as described by Lipsey and Wilson (2001). A categorized inspection of the school level data revealed a weighted overall mean effect size of 0.23 for elementary school (ranging from -.02 to .47), 0.22 for high school (ranging from -.04 to .50), and 0.24 for university level (ranging from .06 to .40) under fixed effects model (See Table 4). Under random effects model, we found the weighted mean effect size as .22 for elementary level, .20 for high school level, and .22 for university level. In both instances, the absolute value of the difference between the correlations was quite small.

Table 4
Summary of Mean Es in Fixed-Random Effects Models by Age

	Fixed effects model			Random effects model		
Age	E.S.(S.E.)	-95% CI	+95% CI	E.S.(S.E.)	-95% CI	+95% CI
University	.24 (.008)	.23	.26	.22 (.016)	.19	.25
High School	.22 (.013)	.19	.24	.20 (.033)	.14	.27
Elementary	.23 (.013)	.21	.26	.22 (.031)	.16	.28
Q-between (Qb)	3.32(p>.05)			.20 (p>.05)		

We compared the effect sizes for the different categories as described by Lipsey and Wilson (2001). In fixed effects model, comparing the effect sizes for the different outcome categories revealed no statistically significant differences between all categories (Q_b = 3.32, p>.05). Likewise, we found that there is no statistically difference between all categories in random effects model (Q_b =.20, p>.05). Non-significant value of Q_b under fixed and random effects models indicates that as a moderator factor, participants' age does not explain the variation of the effect sizes, except the effects beyond that associated with the sampling error.

Culture. We chose the country where the study was conducted as the indicator of its culture. Next, we categorized the studies into two groups as (a) Western culture including studies that have been conducted in the North America, Australia, and Europe, and (b) Eastern culture including studies that have been conducted in Asia. The studies analyzed in this paper were conducted in 15 different countries. The cultural variations between each country would not be easy to identify and document. Hence, we categorized the countries as being a more representative of the Western culture versus being a more representative of the Eastern culture. As Table 5 shows, twice the more studies were conducted in the Western culture than the studies conducted in the Eastern culture.

Table 5
Summary of Study and Effect Size Characteristics by Culture

Culture	n=129 (effect size)	N= 45 (studies)	Mean sample size
Western	91	30	M= 314.7 (SD=188.0)
Eastern	38	15	M= 385.8 (SD=350.9)

We calculated the mean effect sizes for each culture group, underlying the assumption of fixed and random effects models (See Table 6). Under fixed effects model, the weighted overall mean effect sizes are 0.25 for the Western culture (ranging from -.04 to .50), and 0.22 for the Eastern culture (ranging from -.02 to .46). Under random effects model, we found the weighted mean effect size as 0.23 for the Western culture, and 0.19 for the Eastern culture. In both instances the absolute value of the difference between the correlations was quite small.

Table 6
Summary of Mean Es in Fixed and Random Effects Models by Culture

	Fixed effects model			Random effects model		
Culture	E.S.(S.E.)	-95% CI	+95% CI	E.S.(S.E.)	-95% CI	+95% CI
Western	.25 (.008)	.23	.27	.23 (.016)	.20	.26
Eastern	.22 (.009)	.20	.24	.19 (.023)	.14	.24
Qb	5.58(p<.01)			1.24 (p>.05)		

We compared the effect sizes for the different categories. In fixed effects model, comparing the effect sizes for the different outcome categories revealed a statistically significant difference between the categories (Q_b = 5.58, p<.05). However, we found that there is no statistically significance difference between the categories in random effects model (Q_b =1.24, p>.05). A statistically significant value of Q_b under fixed effects model indicates that the culture is a significant contributor to the variation in the effect size. However, under random effects model, the culture does not explain the variation in the effect sizes. Cooper (2010) argued that if the analysis is significant under fixed effects model but not under random effects model, this indicates that "the findings relates only to what past studies have found but not necessarily to the likely results of a broader universe of similar studies" (p.201). The present study's findings suggest that "culture" explains the variation in the effect sizes for the past studies. However,

the same claim-- that the culture explains the variations in the effect sizes-- is not valid for the studies that are not included in the present study.

Subject area. The sampled studies were conducted in various subject areas including physics, business, education, psychology, history, and math. To able to investigate the effect of the subject area on the effect sizes, we categorized the effect sizes into three groups as (if the target sample coming from or the study focused on the particular subject area) a) hard sciences that used to define academic areas perceived as being more scientific or accurate (e. g. physics), b) soft sciences that used to define social science academic areas (e. g. education), and c) mixed that included participants from hard and soft science areas. And we put the studies at elementary and high school levels into the mixed group unless the study focused on any particular subject area. As seen in Table 7, most of the studies analyzed in this paper have been conducted in the hard sciences.

Table 7
Summary of Study and Effect Size Characteristics by Subject Area

Subject area	n=129 (effect size)	N= 45 (studies)	Mean sample size
Hard sciences	57	20	M= 271.2 (SD=54.1)
Soft sciences	29	11	M= 312.4 (SD=175.7)
Mixed sciences	43	14	M=415.6 (SD=451.5)

We computed the mean effect sizes for each "subject area" group under fixed- and random effects models (See Table 8). Under fixed effects model, the weighted overall mean effect sizes are 0.19 for hard sciences (ranging from -.02 to .47), .32 for soft sciences (ranging from -.04 to .46), and .26 for the mixed science category (ranging from .05 to .50). Under random effects model, we found the weighted mean effect size as 0.19 for hard sciences, 0.26 for soft sciences, and 0.22 for the mixed science category.

Table 8
Summary of Mean Es in Fixed and Random Effects Models by Subject Area

	Fixed effects model			Random effects model		
Subject area	E.S.(S.E.)	-95% CI	+95% CI	E.S.(S.E.)	-95% CI	+95% CI
Hard sciences	.19 (.008)	.17	.21	.19 (.020)	.15	.23
Soft sciences	.32 (.014)	.29	.35	.26 (.030)	.20	.32
Mixed sciences	.26 (.010)	.24	.28	.22 (.023)	.17	.27
Qb	74.8(p<.01)			6.19 (p<.05)		

We compared the effect sizes for the different categories. In fixed effects model, comparing the effect sizes for the different outcome categories revealed statistically significant differences between the categories (Q_b (2) = 74.8, p<.01). Also, we found that there is a statistically significant difference between the categories in random effects model (Q_b (2) =6.19, p<.05). A statistically significant value of Q_b under fixed- and random effects models reveals that the subject area can account for the variation in the effect sizes. Again, in both instances the absolute value of the difference between the correlations was quite small.

Sex. To able to investigate the influence of students' sex on the effect size distribution, we used the percentage of female students in the study, which yielded a continuous variable of the female. To estimate the influence of students' sex on the effect size variance, we applied a series of meta-analytic approaches under fixed and random effects models. First, we adopted the general approach described by Cheung (2008) in Mplus 6, which is an innovative way to integrate fixed, random, and mixed effects models of meta-analysis to SEM. Although this approach worked well with the available data under fixed effects model, it did not fit with the available data in random effects model. Therefore, in random effects model we used the traditional weighted regression method described by Lipsey and Wilson (2001) to estimate the parameters.

Lipsey and Wilson (2001) suggested that the standard error (SE) value should be adjusted and then the correct assessment of statistical significance should be tested in the regression analysis for the meta-analytic purposes. We computed the corrected SE values for fixed and random effects models, and found z-test values as 17.9 and 14.9, respectively (See Table 9).

The traditional regression analysis revealed that in fixed effects model the percentage of female students is statistically significantly related to the effect size distribution (R^2= .08, t (female) = 17.9., p <.01).

The standardized coefficient (β =-0.28) indicates that approximately 8% of the variance of the effect size can be explained by the percentage of female participants in the studies. The direction of the relationship is negative, which means that the more female participants in the sample, the lower is the effect size obtained. The traditional regression analysis resulted identical with the SEM analysis.

Table 9
Results of the Traditional Meta-Analytic Regression Analysis by Sex

	Fixed effects model			Random effects model		
	β	SE (β	β(stand.)	β	SE β	β (stand.)
Sex	-0.51 (-.50)	.03** (.01)	-0.286*(-0.28*)	-0.20	.014**	-0.233*

Note: Numbers in parenthesis show the parameters obtained from SEM approach.
*: p <.01 **: Corrected SE values.

In random effects model, the relation between the percentage of female students and the effect size is statistically significant but the strength of the relation is low (β =-0.23). This value indicates that approximately 5% of the variance of the effect size can be explained by the percentage of female participants in the studies (R^2= .05, t (female) = 14.9, p<.01). The adjustment on the variance in random effects model can account for obtaining a small beta coefficient. Again, the direction of the relation between the percentage of the female participants and the effect size is negative.

CONCLUSION and IMPLICATIONS

The present meta-analytic study investigated 45 studies for the relationship between personal epistemology and self-regulated learning strategies from elementary level through college level. The results of the present study are discussed below.

The findings of this meta-analytic study have important implications not only for research on the relationship between personal epistemology and self-regulated learning, but also on the general literature regarding the determinants of and predictors of these on college academic performance. The result of this meta-analysis shows that personal epistemology is positively related to self-regulated learning strategies. The analysis is based on 129 effect sizes from 45 studies and revealed a weighted average effect size of .24 under fixed effects model and .22 under random effects model. This meta-analytic study suggests that the relationship between personal epistemology and self-regulated learning strategies is moderate. Moreover, 5% (R^2=.05) of the variation in self-regulated learning strategies can be explained by personal epistemology.

The previous studies in personal epistemology and self-regulated learning reported that age is a function of development in personal epistemology and self-regulated learning strategies (Buehl, 2008; Hofer & Pintrich, 1997; Driver et al., 1996). The results of this meta-analytic study suggest that even when students get mature, motivation and behaviors of self-regulated learning that are constructed by their personal epistemology remain the same. Additionally, we found that the relationship between personal epistemology and self-regulated learning is statistically different across the cultures under fixed effects model. Yet, that relationship is not statistically significant under random effects model. This result suggests that culture explains the variation that the past studies have reported so far in the relationship between personal epistemology and self-regulated learning; yet, this variation cannot be generalizable to future studies. Overall, the results of the meta-analytic study suggest that greater levels of the Western students' self-regulated learning strategies are explained by their personal epistemologies than those in the Eastern culture countries. This difference across cultures can be explained by the reported strategies that students used. The stereotypical view among the students in Eastern culture countries is that knowledge is something handed down by someone in authority (Purdie et al., 1996). The students in the Eastern culture countries reported that they were more likely to use rote learning strategies (Yumusak, Sungur, & Cakiroglu, 2007). Also they were less likely to seek help from others than students in Western culture countries (Yumusak et al., 2007). The students in the Eastern culture countries were less likely to use management strategies, like collaboration (Dahlin & Watkins, 2000). This may lower the relationship between the personal epistemology and self-regulated learning. Another explanation for the observed variation across the cultures is the instruments that were used. The instruments to measure students' personal epistemology and self-regulation learning were developed first in the U.S. and then translated into other languages and used in other countries (Hofer, 2008). In future studies it is suggested

that researchers in other countries should use instruments developed by the native speaker researchers of the target country.

The meta-analytic review revealed that the relationship between personal epistemology and self-regulated learning strategies is statistically significant across subject areas under fixed and random effects models. This result suggests that the subject area explains the variation in effect sizes of the relationship between personal epistemology and self-regulated learning strategies. The results showed that in soft sciences personal epistemologies predict students' self-regulated learning strategies more than they predict in the hard sciences. This difference in the mean averaged effect size across the subject areas can be explained by the difference in the content of the subject areas. Hard sciences are viewed more paradigmatic than soft sciences since "the content and methodologies employed are more idiosyncratic" (Muis, Bendixen, & Haerle, 2006, p.10). This difference between the hard versus soft sciences may lead students to view the knowledge in the hard sciences more certain, and dependent on the theoretical explanations and rules than the knowledge they view in the soft sciences (Buehl & Alexander, 2005; Hofer, 2000). Consequently, students in the hard sciences may employ more structured and rote learning strategies than in soft science.

The role of the students' sex on personal epistemology and self-regulated learning has been studied in multiple lines of works (Hofer, 2000; Baxter Magolda, 1992). Some studies have found that the students' sex plays an important role to shape their personal epistemologies and self-regulated learning strategies (e.g., Hofer, 2000) whereas some others did not report any variation in terms of students' sex (e.g., Buehl et al., 2002). The negative relationship between the percentage of female students and the effect size can be explained by the expectations from females. Following Perry's (1970) early research with almost all-male student sample in personal epistemology, Belenky and her colleagues (1997) worked on all-female student sample in their research and proposed an epistemology they labeled "women's ways of knowing (WWK)." The substantive studies on WWK reported that girls were more likely to report a connected approach (paying more attention to understand the object of attention) to knowing. In these studies, boys reported "a separate approach" (an approach that views "knowing" different from "the known" by putting their own feelings and values aside, and adopting a neutral perspective) (Clinchy, 2002; Galotti, Drebus, & Reimer, 1999). In addition to this difference in ways of knowing, in social environments girls are more often expected to obey the social rules than boys. In turn, this might discourage girls to have sufficient practice and encourage them to regulate their behaviors and emotions (Davis, 1995).

Some implications for educational research can be drawn from the results of this study. Studies examined in this study have mostly utilized the multidimensional construct of personal epistemology proposed by Schommer (26 out of 45 studies). Schommer's framework draws upon the personal epistemology as a system of interdependent general beliefs about knowledge and learning. However, the results of this study provide evidence that the relationship personal epistemology and self-regulation is domain-specific. In their model of epistemic cognition, Greene and his colleagues (2008) claimed that justification of knowledge can vary across at the domain levels. The results of this study support Greene and his colleagues' model of epistemic cognition. Therefore, the results of this study suggest that the domain-specificity at high school or college levels should be taken into consideration in future studies on personal epistemology, and Greene and his colleague's framework of epistemic cognition may be considered as the leading framework.

Additionally, Greene and his colleagues (2008) argued that justification of knowledge should be considered as multi-dimensional, including justification by authority and personal justification. On the one hand, in their study examining epistemic cognition during the reading of multiple conflicting document, Ferguson, Bråten, and Strømsø (2012) added a third task-based dimension, justification by multiple sources, which refers to the beliefs that justification is corroborated by several sources of information into epistemic cognition model. On the other hand, in her model explaining the relationship between personal epistemology and self-regulated learning, Muis (2007) conceptualized personal epistemology as a part of the task definition phase in self-regulation. Such a task-based dimension of personal epistemology can serve a bridge between personal epistemology and learning task. Therefore, in the task-based studies regarding personal epistemology, it seems adding a task-based dimension of personal epistemology may be beneficial to better understand the function of personal epistemology in the learning task.

Addition to this, Ferguson and her colleagues (2013) developed the Justification for Knowing Questionnaire (JFK-Q), which was used to map the three justification dimensions. The JFK-Q has been used in several recent studies. For example, Ferguson and Braten (2013) validated the three dimensional structure of JFK-Q to map students' justification of knowledge. With utilizing the JFK-Q, Bråten and his colleagues (2014) studied indirect and direct relations amongst dimensions of the justification for knowing in science, motivation for science reading comprehension, and science achievement. Bråten and his colleagues reported the three justification dimensions that Ferguson et al. (2012) discussed were related to students' motivation and achievement in science. More specifically, justification by authority and justification by multiple sources were positively related to self-efficacy (β=0.20 and β =0.25, respectively) and task value (β =0.17 and β =0.43, respectively). Personal justification were negatively associated with self-efficacy (β=-0.22) and task value (β=-0.20). They reported that all three dimensions of justification of knowledge explained 14 and 23% of the variance in self-efficacy and task value, respectively; which is higher than the effect size we found in this study. The contextual variation, of course, can be a reason for this difference. However, it may provide evidence that the JFQ-K better capture students' personal epistemology in a specific task because it includes a task-based dimension of justification of knowledge. Therefore, there is a need to further examine the relation between personal epistemology and self-regulated learning with the task-specific instruments such as JFK-Q.

Limitation of the Findings

This meta-analytic study has certain limitations. First, we included only published studies in English in peer-reviewed journals. Published studies are more likely to report statistically significant results, which may indicate a publication bias (Cooper, 2010). Including the non-significant results, which are usually not published, might lower the averaged effect size. Therefore, we encourage scholars to submit well-done studies for publication, even when results are not statistically significant.

Second, during the analysis, we found that the studies on personal epistemology and self-regulated learning strategies have most often used university level students (85 of 129 effect sizes and 31 of 45 studies). Very little research on personal epistemology and self-regulated learning includes elementary (seven of 45 studies) and high school students (seven of 45 studies). As a limitation relating to the effect of students' age on the relationship, this should be taken into consideration. More studies with younger students are recommended.

Whether personal epistemology and self-regulated learning are domain general or domain specific is a recent discussion (Muis et al., 2006). There is evidence that students may have different beliefs and/or strategies across the disciplines (Hofer, 2000; Buehl et al., 2002). The results of this meta-analytic study support the notion that the motivation and behavioral aspects of self-regulated learning that are constructed by the students' personal epistemologies vary across the hard versus soft sciences. It should be noted that because we grouped the studies as hard, soft, and mixed sciences, any attempt to generalize this study's findings, and conclusions to all science disciplines in hard sciences or soft sciences should be approached with caution. The relationship between personal epistemology and self-regulated learning may vary across disciplines in hard science or soft science. There is evidence that high school students viewed knowledge in physics more certain and unchanging than knowledge in biology (Tsai, 2006). Furthermore, some argue that students' personal epistemologies are task and context dependent (Elby & Hammer, 2010; Sandoval, 2009). Therefore, future studies on personal epistemology and self-regulated learning should focus on the task or discipline specific nature of personal epistemology and self-regulated learning.

Lastly, in this study, we analyzed 129 effect sizes in which they were nested in 45 studies. Because the average number of effect sizes per study is 2.87, fixed effects model has some dependencies because of being in the same study. As a limitation of this study, in the analysis, we made the assumption that these dependencies would not significantly influence the variation with only 2 or 3 effect sizes for per study. Although Cheung (2013) suggests a methodology for multiple effects per study, it has not been validated and requires knowledge of the correlation between effect sizes within the study that is simply not known.

REFERENCES

Baxter Magolda, M. B. (1992). *Knowing and reasoning in college: Gender related patterns in students' intellectual development.* San Francisco, CA: Jossey-Bass.

Belenky, M., Clinchy, B., Goldberger, N., R., & Tarule, J. (1997). *Women's ways of knowing: The development of self, mind, and voice.* New York: Basic Books.

Biglan, A. (1973). The characteristics of subject matter in academic areas, *Journal of Applied Psychology, 57*, 195–203.

Borenstein, M., Hedges, L.V., Higgins, J.P.T., & Rothstein, H.R. (2009). *Introduction to meta-analysis.* West Sussex, U.K.: John Wiley & Sons, Ltd.

Bråten, I., Ferguson, L. E., Anmarkrud, Ø., Strømsø, H. I., & Brandmo, C. (2014). Modeling relations between students' justification for knowing beliefs in science, motivation for understanding what they read in science, and science achievement. *International Journal of Educational Research, 66,* 1- 12.

Bråten, I., Ferguson, L.E., Strømsø, H.I., & Anmarkrud, Ø. (2013). Justification beliefs and multiple documents comprehension. *European Journal of Psychology of Education,* 28, 879–902. doi:10.1007/s10212-012-0145-2.

Bråten, I., & Strømsø, H. I. (2005). The relationship between epistemological beliefs, implicit theories of intelligence, and self-regulated learning among Norwegian postsecondary students. *British Journal of Educational Psychology, 75,* 539–565.

Bromme, R., Pieschl, S., & Stahl, E. (2010). Epistemological beliefs are standards for adaptive learning: A functional theory about epistemological beliefs and metacognition. *Metacognition and Learning, 5*(1), 7–26.

Buehl, M. M. (2008). Assessing the multidimensionality of students' epistemic beliefs across diverse cultures. In M. S. Khine (Eds.), *Knowing, knowledge and beliefs: Epistemological studies across diverse cultures.* (pp. 65- 112) Netherlands: Springer.

Buehl, M. M., & Alexander, P. A. (2005). Motivation and performance differences in students' domain-specific epistemological belief profiles. *American Education Research Journal, 42,* 697–726.

Buehl, M. M., Alexander, P. A., & Murphy, P. K. (2002). Beliefs about schooled knowledge: Domain specific or domain general? *Contemporary Educational Psychology, 27,* 415–449.

Cheung, M.W.-L. (2008). A model for integrating fixed-, random-, and mixed-effects meta-analyses into structural equation modeling. *Psychological Methods, 13,* 182-202.

Cheung, M.W.-L. (2013). Multivariate meta-analysis as structural equation models. *Structural Equation Modeling, 20,* 429-454.

Chen, J. A. (2012). Implicit theories, epistemic beliefs, and science motivation: A person-centered approach. *Learning and Individual Differences, 22,* 724-735.

Chinn, C. A., Buckland, L. A., & Samarapungavan, A. (2011). Expanding the dimensions of epistemic cognition: Arguments from philosophy and psychology. Educational Psychologist, 46, 141–167.

Clinchy, B. M. (2002). Revisiting women's ways of knowing. In B. K. Hofer and P. R. Pintrich (Eds). *Personal epistemology: The psychology of beliefs about knowledge and knowing.* Mahwah, N.J., L. Erlbaum Associates: 63-88.

Cooper, H. (2010). *Research synthesis and meta-analysis.* Thousand Oaks, CA: Sage.

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1997-2003. Review of Educational Research, 76, 1-62.

Corey, D. M., Dunlap, W. P., & Burke, M. J. (1998). Observed and expected bias in average correlation with and without using Fisher's z transformation. Journal of General Psychology, 125, 245-261.

Credé, M., & Philips, A. L. (2011). A meta-analytic review of the Motivated Strategies for Learning Questionnaire. *Learning and Individual Differences, 21,* 337–346.

Dahlin, B., & Watkins, D. (2000). The role of repetition in the process of memorizing and understanding: A comparison of the views of German and Chinese secondary school students in Hong Kong. *British Journal of Educational Psychology, 70,* 65-84.

Davis T. L. (1995). Gender differences in masking negative emotions: ability or motivation? *Developmental Psychology, 31,* 660–667.

Dignath, C., & Büttner, G. (2008). Components of fostering self-regulated learning among students. A meta-analysis on intervention studies at primary and secondary school level. *Metacognition and Learning, 3*(3), 231-264.

Dignath, C., Buettner, G., & Langfeldt, H. (2008). How can primary school students learn self-regulated learning strategies most effectively? A meta-analysis on self-regulation training programmes. *Educational Psychology Review, 3,* 101 – 129.

Driver, R., Leach, J., Millar, R., & Scott, P. (1996). *Young people's images of science.* Buckingham: Open University Press.

Elby, A. & Hammer, D. (2010). Epistemological resources and framing: A cognitive framework for helping teachers interpret and respond to their students' epistemologies. In L. D. Bendixen & F. C. Feucht (Eds.), *Personal epistemology in the classroom: Theory, research, and implications for practice* (pp. 409-434). New York: Cambridge Press.

Elder, A. (2002). Characterizing fifth grade students' epistemological beliefs in science. In B. K. Hofer & P.R. Pintrich (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp. 347-364). Mahwah, NJ: Erlbaum.

Ferguson, L. E. (2015). Epistemic beliefs and their relation to multiple-text comprehension: A Norwegian program of research, *Scandinavian Journal of Educational Research, 59*(6), 731-752, DOI: 10.1080/00313831.2014.971863.

Ferguson, L. E., & Braten, I. (2013). Student profiles of knowledge and epistemic beliefs: Changes and relations to multiple-text comprehension. *Learning and Instruction, 25*, 49–61.

Ferguson, L.E., Bråten, I., & Strømsø, H.I. (2012). Epistemic cognition when students read multiple documents containing conflicting scientific evidence: A think-aloud study. *Learning and Instruction, 22*, 103–120. doi:10.1016/j.learninstruc.2011.08.002

Ferguson, L.E., Bråten, I., Strømsø, H.I., & Anmarkrud, Ø. (2013). Epistemic beliefs and comprehension in the context of reading multiple documents: Examining the role of conflict. *International Journal of Educational Research, 62*, 100–114. doi:10.1016/j.ijer.2013.07.001

Feucht, F., & Bendixen, L. (2010). Personal epistemology in the classroom: a welcome and guide for the reader. In L. Bendixen and F. Feucht (Eds.). *Personal epistemology in the classroom: Theory, research, and implications for practice* (pp. 3-29). New York: Cambridge Press.

Galotti, K., Drebus, D., & Reimer, R. (1999, April). *Ways of knowing as learning styles.* The Biennial Meeting of the Society for Research in Child Development, Albuquerque, NM.

Greene, J. A., Azevedo, R., & Torney-Purta, J. (2008). Modeling epistemic and ontological cognition: Philosophical perspectives and methodological directions. *Educational Psychologist, 43*, 142–160.

Hammer, D. & Elby, A. (2002). On the form of a personal epistemology. In B. K. Hofer, & P. R. Pintrich (Eds.), *Personal epistemology: The psychology of beliefs aboutknowledge and knowing* (pp. 169-190). Mahwah, NJ: Lawrence Erlbaum.

Hofer, B. K. (2000). Dimensionality and disciplinary differences in personal epistemology. *Contemporary Educational Psychology, 25*, 378–405.

Hofer, B. K. (2004). Epistemological understanding as a metacognitive process: Thinking aloud during online searching. *Educational Psychologist, 39*(1), 43-55.

Hofer, B. K. (2008). Personal epistemology and culture. In M. S. Khine (Ed.), *Knowing, knowledge and beliefs: epistemological studies across diverse cultures* (pp. 3–22). Dordrecht: Springer.

Hofer, B. K., & Pintrich, P. R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research, 67*(1), 88–140.

Hunter, J.E. & Schmidt, F.L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings.* Newbury Park, CA: Sage.

Kuhn, D. (1991). *The skills of argument*. Cambridge, England: Cambridge University Press.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis.* Thousand Oak, CA: Sage.

Muis, K. R. (2007). The role of epistemic beliefs in self-regulated learning. *Educational Psychologist, 42*, 173–190.

Muis, K. R., Bendixen, L. D., & Haerle, F. (2006). Domain-generality and domain-specificity in personal epistemology research: Philosophical and empirical reflections in the development of a theoretical framework. *Educational Psychology Review, 18*, 3–54.

Neber, H., & Schommer-Aikins, M. (2002). Self-regulated science learning with highly gifted students: The role of cognitive, motivational, epistemological, and environmental variables. *High Ability Studies, 13*(1), 59-74.

Nussbaum, E. M. (2011). Argumentation, dialogue theory, and probability modeling: Alternative frameworks for argumentation research in education. *Educational Psychologist, 46*(2), 84–106.

Paris, S. G., & Winograd, P. (1999). The role of self-regulated learning in contextual teaching: Principles and practices for teacher preparation. CIERA archive # 01-03. Retrieved on January 26, 2013, fromhttp://www.ciera.org/library/archive/2001-04/0104prwn.pdf.

Perry, W. G. (1970). *Forms of intellectual and ethical development in the college years: A scheme.* New York: Holt, Rinehart and Winston.

Phillips, D. C. (1995). The good, the bad, and the ugly: The many faces of constructivism. *Educational Researcher, 24*(7), 5–12.

Pintrich, P. R., (1995). Understanding self-regulated learning. In: Pintrich, P. R. (ed.), *Understanding self-regulated learning, new directions for teaching and learning,* (pp. 3–12). San Francisco: Jossey-Bass.

Pintrich, P. R. (2002). Future challenges and directions for theory and research on personal epistemology. In: Hofer, B. K., and Pintrich, P. R. (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing*, (pp. 389–414), Maswah, NJ: Lawrence Erlbaum.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the Motivated Strategies for Learning Questionnaire* (MSLQ). Ann Arbor, MI: National Center for Research to Improve Postsecondary Teaching and Learning.

Purdie, N., Hattie, J., & Douglas, G. (1996). Student conceptions of learning and their use of self-regulated learning strategies: a cross-cultural comparison. *Journal of Educational Psychology, 88*(1), 87-100.

Sandoval, W. A. (2009). In defense of clarity in the study of personal epistemology. *Journal of the Learning Sciences, 18*(1), 150-161.

Schoenfeld, A. H. (1989). Exploration of students' mathematical beliefs and behavior. *Journal for Research in Mathematics Education, 20,* 338–355.

Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology, 82,* 498-504.

Schraw, G., Brownlee, J. & Berthelsen, D. (2010). Teachers' personal epistemology and teacher education: emergent themes and future research. In J. Brownlee, G. Schraw, & D. Berthelsen (Eds.). *Personal epistemology and teacher education* (pp. 265–281), New York, NY: Routledge.

Sen, S. & Akbas, N. (2016). A study on multilevel meta-analysis methods. *Journal of Measurement and Evaluation in Education and Psychology, 7,* 1-17.

Sinatra, G. M. (2005). The warming trend in conceptual change research: The legacy of Paul R. Pintrich. *Educational Psychologist, 40,* 107–115.

Topçu, M. S. (2013). Preservice teachers' epistemological beliefs in physics, chemistry, and biology: A mixed study. *International Journal of Science and Mathematics Education, 11,* 433–458.

Tsai, C.C. (2006). Biological knowledge is more tentative than physics knowledge: Taiwan high school adolescents' views about the nature of biology and physics. *Adolescence, 41,* 691-703.

Willson, V. L. (1982). Maximizing reliability in multiple choice questions. *Educational and Psychological Measurement, 42,* 69-72.

Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D.J. Hacker & J. Dunlosky (Eds.), *Metacognition in educational theory and practice: The educational psychology series*. Mahwah, NJ: Erlbaum.

Wolters, C., & Pintrich, P. R. (1998). Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms. *Instructional Science, 26,* 27-47.

Yeaton, W. H., & Wortman, P. M. (1993). On the reliability of metaanalytic reviews: The role of intercoder agreement. *Evaluation Review, 17,* 292–309

Yumusak, N., Sungur, S. and Cakiroglu, J. (2007). Turkish high school students' biology achievement in relation to academic self-regulation. *Educational Research and Evaluation: An International Journal on Theory and Practice, 13*(1), 53-69.

Zimmerman, B., J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner, *Handbook of self-regulation* (pp. 13- 35). San Diego: Academic Press.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal, 45*(1), 166-183.

Zimmerman, B. J., & Pons, M. M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal, 23*(4), 614–628.

APPENDIX A

Sampled Studies Used in Meta-analysis

Barnard, L., Lan, W. Y., Crooks, S. M., & Paton, V. O. (2008). The relationship between epistemological beliefs and self-regulated learning skills in the online course environment. *Journal of Online Learning and Teaching, 4*(3), 261-266.

Bedel, E.F. (2012). An examination of locus of control, epistemological beliefs and metacognitive awareness in preservice early childhood teachers. *Educational Sciences: Theory & Practice, 12*, 3051-3060.

Bell, P. D. (2006). Can factors related to self-regulated learning and epistemological beliefs predict learning achievement in undergraduate asynchronous Web-based courses? *Perspectives in Health Information Management/AHIMA, American Health Information Management Association*, *3*(c). American Health Information Management Association. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2047299/

Briley, J. S. (2007). *An investigation of the relationships among mathematical beliefs, self-regulation, and achievement for university-level mathematics students* (Doctoral dissertation) University of Alabama, Tuscaloosa, AL.

Buehl, M. M., & Alexander, P. a. (2005). Motivation and Performance Differences in Students' Domain-Specific Epistemological Belief Profiles. *American Educational Research Journal*, *42*(4), 697–726. doi:10.3102/00028312042004697

Chen, J. A. (2012). Implicit theories, epistemic beliefs, and science motivation: A person-centered approach. *Learning and Individual Differences*, *22*(6), 724–735. doi:10.1016/j.lindif.2012.07.013

Chen, K. W. (2009). *The study of epistemological beliefs and self-regulated learning for English undergraduate majors*. (Master thesis). Leader University. Tainan, Taiwan.

Chen, J. a., & Pajares, F. (2010). Implicit theories of ability of Grade 6 science students: Relation to epistemological beliefs and academic motivation and achievement in science. *Contemporary Educational Psychology*, *35*(1), 75-87.

Cheng, K.-H., Liang, J.-C., & Tsai, C.-C. (2013). The role of internet-specific epistemic beliefs and self-regulation in high school students' online academic help seeking: A structural equation modeling analysis. *Journal of Educational Computing Research*, *48*(4), 469–489. doi:10.2190/EC.48.4.d

Chiu, Y.-L., Liang, J.-C., & Tsai, C.-C. (2013). Internet-specific epistemic beliefs and self-regulated learning in online academic information searching. *Metacognition and Learning*, *8*(3), 235–260. doi:10.1007/s11409-013-9103-x

Dahl, T. I., Bals, M., & Turi, A. L. (2005). Are students' beliefs about knowledge and learning associated with their reported use of learning strategies? *The British Journal of Educational Psychology*, *75*, 257-73.

Dutton, R. E. (2003). *The impact of epistemology, motivation, and metacognition on performance in case-based classes*. (PhD Dissertation). The State University of New Jersey, New Brunswick, NJ. Retrieved from ProQuest Dissertations & Theses. (UMI No. 3088471).

Harris, C. L. (2003). *Understanding the role of epistemological beliefs in post-graduate studies: Motivation and conceptions of learning in first-year law students.* (Doctoral dissertation) University of Texas. Austin, TX

Holschuh, J. L. (1998). *Epistemological beliefs in introductory biology: Addressing measurement concerns and exploring the relationship with strategy use. University of Georgia, Athens, GA* (PhD Dissertation). Retrieved from ProQuest Dissertations & Theses. (UMI No. 9908606).

Jena, P. C., & Ahmad, L. (2013). Meta cognitive Strategy Usage and Epistemological Beliefs of Primary School Teacher Trainees: An Explorative Study. *International Letters of Social and Humanistic Sciences*, *9*, 1-10.

Jahromi, R. G., Lavasani, M. G., Rastegar, A., & Mooghali, A. (2010). Presenting a model of predicting computer anxiety in terms of epistemological beliefs and achievement goals. *Computers in Human Behavior*, *26*(4), 602–608.

Kizilgunes, B., Tekkaya, C., & Sungur, S. (2009). Modeling the relations among students' epistemological beliefs, motivation, learning approach, and achievement. *The Journal of Educational Research*, *102*(4), 243–256.

Köksal, M. S. (2011). Epistemological predictors of "self-efficacy on learning Biology" and "test anxiety related to evaluation of learning on biology" for pre-service elementary teachers. *Journal of Science Teacher Education*, *22*(7), 661–677.

Law, Y., Chan, C. K. K., & Sachs, J. (2008). Beliefs about learning, self-regulated strategies and text comprehension among Chinese children. *The British Journal of Educational Psychology*, *78*, 51-73.

Lin, T.-J., Deng, F., Chai, C. S., & Tsai, C.-C. (2013). High school students' scientific epistemological beliefs, motivation in learning science, and their relationships: A comparative study within the Chinese culture. *International Journal of Educational Development*, *33*(1), 37–47. doi:10.1016/j.ijedudev.2012.01.007

Mason, L., Boscolo, P., Tornatora, M. C., & Ronconi, L. (2013). Besides knowledge: a cross-sectional study on the relations between epistemic beliefs, achievement goals, self-beliefs, and achievement in science. *Instructional Science*, *41*(1), 49–79.

Mellat, N., & Lavasani, M. G. (2011). The role of epistemological beliefs, motivational constructs and information processing strategies in regulation of learning. *Procedia - Social and Behavioral Sciences*, *30*, 1761-1769.

Metallidou, P. (2012). Epistemological beliefs as predictors of self-regulated learning strategies in middle school students. *School Psychology International*, *34*(3), 283–298. doi:10.1177/0143034312455857

Muis, K. R. (2004). *Epistemic styles and mathematics problem solving: Examining relations in the context of self-regulated learning*. (PhD Dissertation). Simon Fraser University.

Muis, K. (2008). Epistemic profiles and self-regulated learning: Examining relations in the context of mathematics problem solving. *Contemporary Educational Psychology*, *33*(2), 177-208.

Muis, K. R., & Franco, G. M. (2009). Epistemic beliefs : Setting the standards for self-regulated learning. *Contemporary Educational Psychology*, *34*(4), 306-318.

Muis, K. R., & Franco, G. M. (2010). Epistemic profiles and metacognition: Support for the consistency hypothesis. *Metacognition and Learning*, *5*, 27-45.

Muis, K. R., Kendeou, P., & Franco, G. M. (2011). Consistent results with the consistency hypothesis? The effects of epistemic beliefs on metacognitive processing. *Metacognition and Learning*, *6*(1), 45-63.

Neber, H., & Schommer-Aikins, M. (2002). Self-regulated Science Learning with Highly Gifted Students: The role of cognitive, motivational, epistemological, and environmental variables. *High Ability Studies*, *13*(1), 59-74.

Nielsen, S. G. (2011). Epistemic beliefs and self-regulated learning in music students. *Psychology of Music*, *40*(3), 324-338.

Paulsen, M. B., & Feldman, K. A. (2005). The conditional and interaction effects of epistemological beliefs on the self-regulated learning of college students: Motivational strategies. *Research in Higher Education*, *46*(7), 731-768.

Paulsen, M. B., & Feldman, K. A. (2007). The conditional and interaction effects of epistemological beliefs on the self-regulated learning of college students: Cognitive and behavioral strategies. *Research in Higher Education*, *48*(3), 353-401.

Phan, H. P. (2008). Multiple regression analysis of epistemological beliefs, learning approaches, and self-regulated learning. *Electronic Journal of Research in Education Psychology*, *6*(1), 157-184.

Rastegar, A., Jahromi, R. G., Haghighi, A. S., & Akbari, A. R. (2010). The relation of epistemological beliefs and mathematics achievement: The mediating role of achievement goals, mathematics self-efficacy, and cognitive engagement. *Procedia - Social and Behavioral Sciences*, *5*, 791-797.

Ravindran, B., Greene, B. A., & Debacker, T. K. (2005). Predicting pre-service teachers' cognitive engagement with goals and epistemological beliefs. *The Journal of Educational Research*, *98*(4), 222-233.

Richter, T., & Schmid, S. (2010). Epistemological beliefs and epistemic strategies in self-regulated learning. *Metacognition and Learning*, *5*(1), 47-65.

Savoji, A. P., Niusha, B., & Boreiri, L. (2013). Relationship Between Epistemological Beliefs, Self-regulated Learning Strategies and Academic Achievement. *Procedia - Social and Behavioral Sciences*, *84*, 1160–1165. doi:10.1016/j.sbspro.2013.06.719

Simic, N., Savanovic, L., & Jokic, T. (2012). Relationship between epistemological beliefs and motivational orientation among high school students. *Psihologija*, *45*(4), 451–465. doi:10.2298/PSI1204451S

Stahl, E., Pieschl, S., & Bromme, R. (2006). Task complexity, epistemological beliefs and metacognitive calibration: An exploratory study. *Journal of Educational Computing Research*, *35*(4), 319-338.

Strømsø, H. I., & Bråten, I. (2010). The role of personal epistemology in the self-regulation of internet-based learning. *Metacognition and Learning*, *5*(1), 91-111.

TÜRKÇE GENİŞLETİLMİŞ ÖZET

Epistemolojik inançlar ve *öz-düzenleyici öğrenme* öğrencilerin öğrenmelerinde önemli rol oynar. Birinci terim, epistemolojik inançlar, öğrencilerin bilgi ve bilme hakkındaki fikirlerini ifade eder. İkinci terim, öz-düzenleyici öğrenme, ise öğrencilerin aktif ve yapıcı olarak kendi öğrenmelerini izlemelerini ve öğrenme etkinliğini başarı bir şekilde tamamlamak için motivasyonlarını ve davranışlarını kontrol etmesi sürecidir. Son yıllarda eğitim alanında yapılan çalışmalar, öğrencilerin epistemolojik inançları ile öz-düzenleyici öğrenme stratejileri arasında yakın bir ilişki olduğunu göstermektedir. Muis' ye (2007) göre bireyin sahip olduğu epistemolojik inançlar bireyin hedeflerini, öğrenme amaçlarını ve öğrenmede kullandıkları bilişsel stratejilerini etkilemektedir. Bu ilişkinin çalışmalarda ne kadar desteklediğinin ve güçlü olduğunun belirlenmesi yapılacak çalışmalara yol gösterebilir. Ayrıca alan yazında kültür, cinsiyet, yaş ve konu alanı gibi epistemolojik inançlar ve öz-düzenleyici öğrenme stratejilerini etkileyen olası faktörlerin bu ilişkiye etkisinin incelenmesi bu ilişkinin doğasını anlamamıza yardımcı olabilir. Bu yüzden bu çalışmanın amacı, meta-analiz yöntemi kullanarak epistemolojik inançlar ile öz-düzenleyici öğrenme stratejileri arasındaki ilişkinin etki büyüklüğünü (effect size) belirlemek ve kültür, cinsiyet, yaş ve konu alanı değişkenlerinin etki büyüklüğüne etkisini incelemektir.

Yöntem

Bu meta-analiz çalışmasında, alan yazında epistemolojik inançlar ile öz-düzenleyici öğrenmeyi inceleyen tüm nicel çalışmalar anahtar kelimeler kullanılarak PsychINFO, Eric, Google scholar veri tabanlarında taranmıştır. Epistemolojik inançların, motivasyonel, bilişsel, üstbilişsel ve kaynak yönetimi stratejileri gibi öz-düzenleyici stratejilerle ilişkisini inceleyen bildiri, makale ve tezler incelenmiştir. Seçim kriterleri olarak 2013 yılına kadar yapılmış olan çalışmalar dâhil edilmiştir. Etki büyüklüğünü hesaplamak için sabit-etki (fixed-effect) ve rastgele-etkiler (random-effect) modelleri kullanılmıştır. Etki büyüklüğü hesaplanırken değişkenler arasında rapor edilmiş olan Pearson korelasyon katsayısı kullanılmıştır. Meta-analiz yapılmadan önce ön koşul olan Q Homojenlik testi yapılmıştır. Yapılan Q homojenlik testine göre sonuçlarına göre anlamlı farklılık bulunmuştur (Q = 152, 09), p (Q) <. 01). Bu sonuç etki büyüklükleri arasında örnekleme hatasında farklı olarak moderatör değişkenlerin etkisinden dolayı farklılık olduğunu göstermektedir. Moderatör değişkenlerin etkisini incelemek için elde edilen etki büyüklükleri yaş için, ilköğretim, lise ve üniversite olmak üzere üç gruba, kültür için doğu ve batı olmak üzere iki gruba ve konu alanı için, sayısal, sözel ve karma olmak üzere üç gruba ayrılmıştır. Cinsiyet değişkeninin etki büyüklüğüne etkisini incelemek için her bir çalışmadaki kız öğrenci oranı kullanılmıştır. Moderatör değişkenlerin etki büyüklüğüne etkisinin incelenmesi amacıyla gruplar için ANOVA ve sürekli değişkenler içinse regresyon yöntemi kullanılmıştır.

Tartışma ve Sonuç

Alan yazın taraması sonucunda 15 ülkeden toplam 40 çalışma bulunmuş ve bu çalışmalarda toplam 129 etki büyüklüğü hesaplanmıştır. Ortalama etki büyüklüğü (*r*) ise sabit-etki modelinde .24 ve rastgele-etkiler modelinde ise .22 olarak bulunmuştur. Yaş değişkeni gruplarında ortalama etki büyüklüğü ilköğretim grubunda sabit-etki modelinde .23 ve rastgele-etkiler modelinde .22, lise grubunda sabit-etki modelinde .22 ve rastgele-etkiler modelde .20 ve üniversite grubunda sabit-etki modelinde .24 ve rastgele-etkiler modelinde .22 olarak bulunmuştur. ANOVA sonuçları, gruplar arasında etki-büyüklüğünde anlamlı bir farklılık olmadığını göstermiştir (Q_b (1) = 3.32, p>.05). Kültür değişkeni gruplarında ortalama etki büyüklüğü batı kültürü grubunda sabit-etki modelinde .25 ve rastgele-etkiler modelinde .23 ve doğu kültürü grubunda sabit-etki modelinde .22 ve rastgele-etkiler modelde .19 olarak bulunmuştur. ANOVA sonucuna göre gruplar arasında etki-büyüklüğünde sabit-etki modelinde anlamlı bir farklılık göstermiş (Q_b (1) = 5.58, p<.05) fakat rastgele-etkiler modelinde ise anlamlı farklılık olmadığı bulunmuştur (Q_b (1) = 1.24, p>.05). Konu alanı gruplarında ortalama etki büyüklüğü sözel konu alanında sabit-etki modelinde .32 ve rastgele-etkiler modelinde .26, sayısal konu alanında her iki modelde de .19 ve karma konu alanında sabit-etki modelinde .26 ve rastgele-etkiler modelde .22 olarak bulunmuştur. ANOVA sonucuna göre gruplar arasında etki-büyüklüğünde sabit-etki (Q_b (2) = 74.8, p <.01) ve rastgele-etkiler (Q_b (2) = 6.19, p <.05) modellerinde anlamlı bir farklılık göstermiştir. Regresyon analizinde kız öğrenci oranı ile etki büyüklüğü arasında negatif bir ilişki bulunmuştur (sabit-etki modeli için β =-.28, p < .01 ve rastgele-etkiler modeli için β =-.23, p < .01).

Bu çalışmada hesaplanan etki büyüklüğü, epistemolojik inançların öz-düzenleyici stratejilerle orta düzeyde pozitif bir ilişkili olduğunu göstermektedir. Bu yüzden öğrencilerin epistemolojik inançlarını geliştirilmesi öz-düzenleyici öğrenme becerilerinin de gelişmesine yardımcı olacaktır. Yapılan ANOVA analizleri sonucunda epistemolojik inançlar ile öz-düzenleyici öğrenme stratejileri arasındaki ilişkinin yaş ile değişme göstermediği fakat konu alanı ve kültürün bu ilişki üzerine etkisi olduğu bulunmuştur. Etki büyüklüğü batı kültüründe ve sözel konu alanında daha büyüktür. Bu sonuç, öğrencilerin doğu kültüründe ve sayısal alanlarda daha fazla ezberleyici öğrenme stratejilerini kullanmasıyla açıklanabilir. Bu çalışmada incelenen ve anlamlı etkisi bulunan kültür, konu alanı ve cinsiyet değişkenlerinin epistemolojik inançlar ve öz-düzenleyici öğrenme ile ilgili teorik modellerde göz önüne alınması gerekir.

Bununla birlikte, bu çalışmanın sonuçları, epistemolojik inanç ile öz-düzenleyici stratejiler arasındaki ilişkinin konu alanına özgü olduğunun kanıtlarını ortaya koymaktadır. Greene ve meslektaşları (2008), epistemolojik biliş modellerinde, bilginin gerekçelendirilmesinin etki alanı düzeylerinde farklılık gösterebileceğini iddia ettiler. Bu çalışmanın sonuçları Greene ve meslektaşlarının epistemolojik biliş modelini desteklemektedir. Bu nedenle, bu çalışmanın sonuçları, lise ya da kolej düzeyindeki etki alanına özgüllüğün gelecekteki kişisel epistemoloji çalışmalarında dikkate alınması gerektiğini ve Greene ile meslektaşlarının epistemolojik biliş çerçevesinin önde gelen bir çerçeve olarak düşünülebileceğini düşündürmektedir.

TURJE
www.turje.org

Volume 6 Issue 2

DOI: 10.19128/turje.294844

Turkish Journal of Education
Research Article

Received 23.02.2017
Accepted 19.06.2017

Sixth grade students' attitude toward science course

Burcu Babaoğlan
Kahramanmaraş Sütçüimam University, Graduate School of Science and Technology, Kahramanmaraş, Turkey, burcu-8980@hotmail.com
Tuğba Arıkan
Kahramanmaraş Sütçüimam University, Faculty of Education, Kahramanmaraş, Turkey, tugbaarikan@ksu.edu.tr

ABSTRACT The aim of the research is to analyse the 6th grade secondary school students' attitude toward science course in terms of their genders, parental professions, the number of the books they read and their interest in science. A questionnaire, specially prepared for this research, was used to examine the attitude of the students toward science course. The surveys of this study accomplished 318 sixth grade students in two different schools of Dulkadiroğlu, Kahramanmaraş. The data collection was carried out during the 2016-2017 academic years. One way analysis of variance and independent samples t test were used. According to the research results, the students' attitude toward science course were at high level and positive. The students who are interested in science course were observed to have considerably high attitude towards science course. However, no significant and meaningful relation was found between students' science course attitude and their genders and parental profession.

Keywords *Attitude, Science course attitude, Science course*

Altıncı sınıf öğrencilerinin fen bilimleri dersine yönelik tutumları

ÖZ Bu araştırmanın amacı ortaokul 6. sınıf öğrencilerinin fen bilimleri dersine yönelik tutum düzeyinin cinsiyetlerine, anne-baba mesleklerine, haftada okudukları kitap sayılarına ve fen bilimleri dersini sevip sevmeme durumlarına göre incelenmesidir. Araştırma kapsamında geliştirilen "Fen Bilimleri Dersine Yönelik Tutum Anketi" veri toplama aracı olarak kullanılmıştır. Veriler 2016-2017 eğitim-öğretim yılı 1. döneminde Kahramanmaraş' ta bulunan iki ortaokulda toplam 318 6.sınıf öğrencisinden toplanmıştır. Verilerin analizinde tek yönlü varyans analizi ve bağımsız gruplar t testinden yararlanılmıştır. Araştırmanın sonuçlarına göre öğrencilerin fen bilimleri dersine yönelik tutumları oldukça yüksek seviyede ve olumludur. Fen bilimleri dersini seven öğrencilerin fen bilimleri dersine yönelik tutumlarının yüksek olduğu görülmüş fakat öğrencilerin fen bilimleri dersine yönelik tutum puanları ile cinsiyetleri ve anne-baba meslekleri arasında anlamlı bir ilişki bulunmamıştır.

Anahtar Kelimeler *Tutum, Fen tutumu, Fen bilimleri dersi*

INTRODUCTION

Knowledge simply refers to the condition of knowing something. It is the information, facts, principles, skills and understanding, etc. that is acquired through education and experience. It is knowledge that has equipped man with the limitless power with which man dominates over all beings who are physically much stronger than him. Knowledge has significantly helped him to conquer the nature and this conquest has prompted human to understand nature, keep pace with changes, solve problem and increase life quality (Tezcan, 2011). Today's world requires discovering new things continuously and increasing knowledge. Science is one of the prominent fields which advancing technology is based on (İşman et al., 2002). Science is extremely important in everyday life because there is not one aspect of daily living that science has not made easier, faster or safer. Science results in technology that people rely on for health, communication, transportation etc. Scientific knowledge helps people understand the world from a cellular to a universal level. In today's world, the importance of science teaching is increasing gradually and all societiesn, particularly the developed ones, are in a continuous struggle for increasing the quality of science teaching (Milli Eğitim Bakanlığı [MEB], 2013). Because science is one of the most important gates opening to the world (Yaygın & Sidekli, 2014).

In our daily language, the words belief, view and attitude are confused with each other and sometimes they are used interchangeably. As the number of researches about attitude increases, the attitude concept has started to gain a certain meaning and there have been some changes in its definition. Attitude towards a certain issue plays a crucial role in teaching and learning process of that issue and reaching the desired goals. Therefore, attitude is as important as interest and academic self-confidence and they should be taken into consideration for the planning of learning experience. It is a known fact that the technologies arising from science is being used more and more in our daily life and people feel themselves obliged to use these technologies in every field of their lives. We should encourage the students to be more aware of the importance of science education because by means of science education students will learn how to understand nature, collect data through scientific methods and analyze them, communicate effectively and behave responsibly and, as a result, be science literate (Akgün, 2004). Being literate individuals in science acquiring such kind of qualifications can only be achieved by increasing science interest and developing positive attitude toward science (Kozcu Çakır et al., 2007). If attitude is positive, individuals enjoy what they do more. (Bakırcı, 2010).

One of the primary aims of science education is to create individuals having positive attitude toward science course. It is necessary to start to teach science at earlier ages at schools so that students can develop positive attitude toward science course. At science, necessary atmosphere should be created in order to enable students to think and study like a scientist. By this way, students can develop positive attitude towards science course and scientific studies and improve scientific study abilities (Baran, 2013). According to (Buluş Kırıkkaya, 2011), science course teaching should be started beginning from childhood ages. Age range of 8-14 is critical period for the development of positive attitude towards science course (Şeker, 2012).

Attitude towards science course is closely related with the students' living style. For this reason, various approaches should be used to affect students' attitude positively (Moralar, 2012). Such factors as providing suitable class atmosphere together with rich materials, using research abilities, learning by doing, making science course more enjoyable and attending the class regularly have a significant influence on developing positive attitude towards science (Karakoç, 2016).

Since science course mostly comprises of abstract concepts, students usually have difficulty in understanding and concentrating on the classes. In learning process of science course, in addition to cognitive factors, attitude is also important. The aim of science teaching should be not only to make students develop positive attitude towards science course but also to acquire the knowledge and abilities needed in their daily life and later education years to adapt to changes made in education system and updated programs (MEB, 2013). For an effective science education, it is necessary to determine students' attitude toward science course and to prevent, or at least to minimize, students' developing negative attitude towards science course. Such a negative attitude against science course can affect students' success, later learnings and even their career. It is very important for students to comprehend the fact that they can make their life more meaningful by means of various activities and they need science to organize their daily life. Attitude and value, one of the seven learning domains in Science and Technology Teaching Programme, seems quite remarkable. According to this, knowledge, ability and

developing an understanding are alone not enough for students to become Science and Technology literate. In addition to these, certain attitude and values should be developed for students (MEB, 2004). It is important that students learn science effectively and consciously to develop positive attitude towards science course that emerge as a result of people's analysis and observation of nature and natural facts to make life easier (Bozdağan & Yalçın, 2005).

The aim of this research is to determine whether the 6th grade secondary school students' attitude towards science course varies depending on the students' gender, parental profession, the number of books that they read weekly and being interested in science course.

In accordance with the aim of research, answers to the following questions were searched:

1. What are 6th grade students' attitude scores toward science course?
2. Do science course attitude scores of 6th grade secondary school students vary in terms of gender?
3. Do science course attitude scores of the 6th grade secondary school students vary in terms of mother's profession?
4. Do science course attitude scores of the 6th grade secondary school students vary in terms of father's profession?
5. Do science course attitude scores of the 6th grade secondary school students vary depending on the number of books they read weekly?
6. Do science course attitude scores of the 6th grade secondary school students vary depending on being interested in science course?

METHODOLOGY

In this research the attitude of 6th grade secondary school students towards science course were analyzed in terms of various variables. We used screening model in this research. The screening model aims to interpret a situation lived in the past or exists now as it is. The sample in this research tries to define the object or the situation in its own conditions as it is (Karasar, 2009).

Sample Group

The participants of the present study were consisted of the sixth grade secondary school students of two public schools in Dulkadiroğlu-Kahramanmaraş in 2016-2017 academic years. The survey was completed with the sample that consisted of 318 students. The students volunteers were both 127 females and 191 males students. Schools were selected from same region expressing similar socioeconomic status. Details about the personal characteristics of the students who attended to the research as sample is given in the tables below.

Table1

Demographic Characters Of Sample Groups

Demographic Characters		f	%
Gender	Female	127	39.9
	Male	191	60.1
Mother' s Profession	Housewifes	277	87.1
	Teacher	3	0.9
	Other	38	11.9
Father' s Profession	Self employed	61	19.2
	Teacher	10	3.1
	Engineer	4	1.3
	Retired	21	6.6
	Other	222	69.8
Number Of Weekly Read Books	1-3	175	55
	4-6	69	21.7
	Other	74	23.3
Being Interested In Science Course	Yes	277	87.1
	No	41	12.9

It is seen in table 1 that 127 (39.9%) of 318 students attending to the research are female students and 191 (60.1%) are male students. It is seen that 277 (87.1%) students' mothers are housewives, 3 (0.9%)

of them are teachers and 38 (11.9%) of them are in other job groups. It is seen that 61 (19.2%) of 318 students' fathers are self-employed, 10 (3.1%) of them are teachers, 4 (1.3%) of them are engineers, 21 (6.6%) of them are retired, 222 (69.8%) of them are in in other job groups. It is seen that among 318 students attending to the research, there are 175 (55%) students who read 1-3 books a week, there are 69 (21.7%) students whose number of books read weekly change from 4 to 6 and there are 74 (23.3%) students whose weekly book number is out of given ranges. It is seen 277 (87.1%) of 318 students attending to the research like science course, 41 (12.9%) of them dislike science course.

Data Collection Tool

A Science Course Attitude Questionnaire was developed in order to identify the factors that influence the secondary school students' attitude toward science course. There were 25 items in the survey to test students attitude towards science course. The content of the questionnaire was prepared by taking the science curriculum into account. For the validity checking of the questionnaire, content and construct validity were looked into. According to (Büyüköztürk, 2002), in order for a factor to measure the item, the factor load value which shows the factor's relation with that item should be 0.45 or higher. For only a few of the items can this value be lowered up to 0.30. We based this measurement on the criteria that the factor load value should be 0.30 or higher. The analysis results showed that the science course attitude questionnaire had one dimensional structure which had 25 items. According to (Tavşancıl, 2002), in factor analysis, Kaiser-Meyer-Olkin (KMO) test should be applied in order to determine the efficiency of the data obtained from the sample. KMO is a quantity related to coherence of the correlation between the sample and scale items. That KMO values are higher than 0.60 shows its acceptability (Kaiser, 1974). Kaiser-Mayer-Olkin (KMO) value and Barlett value of the Science Course Attitude Questionnaire found as 0.95 and 11433.3 respectively. These values were regarded as high. Therefore, these results showed the applicability of factor analysis and presence of correlation between the items.

Cronbach alpha reliability co-efficient was found as 0.81, which shows high reliability level of the survey. According to (Tavşancıl, 2002), cronbach alpha reliability coefficient value is acceptable if it is higher than 0.60. The data regarding the factor and reliability analysis were summarized in the table 2.

Table 2

The result of factor analysis, descriptive statistics, reliability co-efficient

	X	S.D.	Factor Load	Alpha
1. I like science course.	4.0768	1.27410	.668	
2. I would like to have an occupation related to science course.	3.2152	1.29517	.364	
3. I would like to use the knowledge I got from science course.	3.8422	1.24033	.598	
4. Science course is a difficult subject.	2.4802	1.29376	.320	
5. I think what I learn in science course is beneficial.	4.0110	1.31867	.681	
6. I think I improve my knowledge through science course.	3.9646	1.26495	.686	
7. I have always been interested in science course.	3.6810	1.25116	.546	
8. I would like to deal with science course in my free time.	3.2667	1.20449	.577	
9. I devote more time to science course than other subjects.	2.8674	1.09567	.552	
10. Science course is one of the most prominent subjects that I am interested in.	3.3328	1.20750	.471	
11. I think science course is an enjoyable subject.	3.9130	1.99747	.386	
12. I would be glad if there were no science course at school.	1.9586	1.29011	.512	
13. I think science course facilitates our daily life.	3.7948	1.32635	.551	0.81
14. I study science course since I have to do so.	2.3581	1.39015	.469	
15. Science related news on TV attract my attention.	3.5431	1.34429	.429	
16. I like reading the books telling the life stories of scientists.	3.4265	1.41827	.431	
17. I think science course is quite effective in learning the natural events.	3.7314	1.31143	.478	
18. I like participating the debates related to science course.	3.4426	1.35378	.419	
19. I am usually bored in science course.	2.1351	1.26544	.616	
20. I would prefer to have more science course at school.	3.1571	1.36022	.499	
21. I don't think science course is necessary subject.	2.0566	1.39168	.456	
22. I would like to be world-famous scientist.	3.5507	1.49583	.749	
23. I would like to create striking inventions.	3.7061	1.42663	.680	
24. I am usually withdrawn in science course.	2.1951	1.34433	.490	
25. I like solving science problems.	3.7728	1.35807	.599	

Analysis Of Data

Survey Data Analysis was graded as "I completely disagree 1, I disagree 2, I am indecisive 3, I agree 4, I completely agree 5". Students' gender, parental profession, the number of books they read weekly and being interested in Science course were the obtained personal information. The data received from this information was coded as numerically and processed with the packaged program. Frequency (f) and percentage distribution (%) were calculated to describe students' personal information. Certain tables were prepared by using the findings. For the analyzing of the data, independent samples t test and one way analysis of variance statistics techniques were used. We can get at least 25 and at most 125 scores from the survey. High score obtained from the survey means that students have positive attitude towards science course.

FINDINGS

The research problem was stated as "How are 6th grade students' attitude scores towards science course?" To answer this question, the arithmetic average and standard deviation value of the students' scores were calculated. The attitude scores of students are given below.

Table 3
The Attitude Score

Attitude Score	N	X	S.D
Total	318	83.62	15.27

When table 3 is analyzed, the average of answers of 318 students given to the questionnaire was found as 83.62. According to this finding, it can be said that 6th grade students at secondary school have quite high attitude scores.

The sub-problem in the research was stated as "Do attitude scores of 6th grade secondary school students vary depending on gender?" Table 3 shows the results of t test which was made to determine whether students' average attitude score varied depending on the variable of gender or not. To analyze the relation of gender with Science Course Attitude Questionnaire students were classified in two groups as "female" and "male" and the average, standard deviation and t values of variables according to gender groups are illustrated in below table 4.

Table 4
T Test Results Of Gender Variable

Gender	N	X	S.D	d.f	t	p
Female	127	3.40	.535	316	1.395	*.164*
Male	191	3.30	.654			

According to Table 4, 127 female and 191 male students involved in the study. When the scores that the students got from the science attitude questionnaire are viewed, it is found out that there is no significant difference between the attitude scores of the students in terms of gender ($t(316)= 1.395$, $p>.05$). Judging from this finding, we can conclude that gender has no significant effect on the science attitude scores.

The sub-problem was stated as "Do science attitude scores of the 6th grade secondary school students varied in terms of mother's profession?" In order to answer this sub- problem, standard deviation and arithmetic mean values were calculated. The science attitude scores of the students and descriptive statistical results belonging to mother's profession factor were shown in Table 5.

Table 5
Descriptive Statistical Results of Mother's Profession and Variance

Mother's profession	N	X	SD	Variance Source	Sum Of Squares	DF	Mean Squares	F	p
Housewife	277	3.33	.62	Inter-group	.766	2	.383		
Teacher	3	3.81	.32	Intra-groups	117.468	315	.373	1.027	*.359*
Other	38	3.38	.51	Total	118.234	317			
Total	318	3.34	.61						

In order to find answer to the question of whether the science attitude scores of the students varied depending on the mother's profession, we applied one-way variance analysis. The related data were shown in Table 5.

When Table 5 is viewed it is observed that the science attitude scores of the students vary depending on their mother's professions (p>.05). However, this difference is not statistically significant. In fact, we can say that the scores of the students in terms of mother's profession are similar to each other. It can be concluded from this finding that the science attitude scores of the students do not change significantly depending on the mother's profession. Even if it is not statistically significant, the scores of the students whose mothers are teacher are relatively higher compared to the other students.

The sub-problem was stated as "Do science attitude scores of the 6th grade secondary school students differentiate in terms of father's profession?" In order to answer this sub-problem, standard deviation and arithmetic mean values were calculated. The science attitude scores of the students and descriptive statistical results belonging to father's profession factor were shown in Table 6.

Table 6

Descriptive Statistical Results of Father's Profession Factor and Variance

Father's Profession	N	X	SD	Variance Source	Sum Of Squares	DF	Mean Squares	F	p
Self employed	61	3.18	.53	Inter-group	2.664	4	.666		
Teacher	10	3.22	.60	Intra-groups	115.570	313	.369		
Engineer	4	3.16	1.20	Total	118.234	317		1.804	*.128*
Retired	21	3.27	.55						
Other	222	3.40	.61						
Total	318	3.34	.61						

In order to find answer to the question of whether the science attitude scores of the students differentiate depending on the father's profession, we applied one-way variance analysis. The related data were shown in Table 6. When Table 6 is viewed it is observed that there is no significant difference between the science attitude scores of the students depending on their father's professions (p>.05). It can be concluded from this finding that father's profession has no statistically significant effect on the science attitude scores of the students. Even if it is not statistically significant, the scores of the students whose mothers are teacher have relatively higher science attitude scores. Although it is not statistically significant, the students whose fathers are teacher have relatively higher science attitude scores.

The sub-problem was stated as "Do science attitude scores of the 6th grade secondary school students varied depending on the number of books they read weekly?" In order to answer this sub- problem, standard deviation and arithmetic mean values were calculated. The science attitude scores of the students and descriptive statistical results of the number of books they read weekly were shown in Table 7.

Table 7

Descriptive Statistical Results of the Number of Books the Students Read Weekly and Variance

Number of Weekly Read Books	N	$\bar{X}$	SD	Variance Source	Sum Of Squares	DF	Mean Squares	F	p
1-3	175	3.26	.62	Inter-group	2.972	2	1.486		
4-6	69	3.50	.60	Intra-groups	115.262	315	.366		
Other	74	3.37	.55	Total	118.234	317		4.061	*.018*
Total	318	3.34	.61						

In order to find answer to the question of whether the science attitude scores of the students varied depending on the number of the books read by the students in a week, we applied one-way variance analysis. The related data were shown in Table 7. When Table 7 is viewed it is observed that there is a significant difference between the science attitude scores of the students depending on the number of the books they read weekly (p>.05). It can be concluded from this finding that the number of the books

they read weekly has statistically significant effect on the science attitude scores of the students. It has been observed that as the number of books they read weekly increases, so do their science attitude scores. The sub-problem was stated as "Do science attitude scores of the 6th grade secondary school students differentiate depending on being interested in science course?" In order to answer this sub-problem in the survey, the answers that the students gave to the science attitude survey were evaluated and the related data were shown in Table 8.

Table 8
T-Test Results of Being Interested in Science Course

Being Interested In Science Course	N	X	SD	DF	t	p
Yes	277	3.46	.515	316	10.428	*.000*
No	41	2.54	.607			

When we look through the data in Table 8, we observe that there is significant difference between the scores that the students got from science course attitude questionnaire depending on being interested in science course (t [316] =10.428, p<.01). We can conclude from this finding that the attitude of the students who are interested in science course is more positive than those who are not interested in science course. We also evaluated the correlation between the scores that the 6th grade secondary school students got from science course attitude questionnaire and being interested in science course and the results of related data analysis are shown in Table 9.

Table 9
Correlation Between Attitude and Interest

		Attitude	Interest
Attitude	r	1	.691
	p		*000*
	N	318	318
Interest	r	.691	1
	p	*000*	
	N	318	318

When we look through the table 9, we observe that there is a positive and statistically significant relation between students' being interested in science course and the scores they got from the science course attitude questionnaire (p<.01), which means that the students who are interested in science course have relatively higher science course attitude scores and they have positive attitude toward science course.

DISCUSSION and CONCLUSION

The aim of the research is to determine whether the 6th grade secondary school students' attitude toward science course varies depending on the students' gender, parental profession, the number of books that they read and being interested in science course and the results derived from the findings are summarized below.

Although the female students in the study had higher average science course attitude scores with respect to the male students, it was not statistically significant. Therefore, it can be concluded that gender factor has no significant effect on the science course attitude scores of the 6th grade secondary school students. We saw similar results in the literature. According to the study conducted by (Güden & Timur, 2016), gender has no significant effect on the science attitude scores of the secondary school students at different levels (5th , 6th , 7th ,8th grades). (Kozcu Çakır et al., 2007) concluded in their study that according to independent t-test results there is no significant difference between the gender factor and science attitude scores of the students. Similarly, as a result of the data analysis in their study, (Sinan, Şardağ, Salifoğlu, Çakır, & Karabacak, 2014) stated that gender had no effect on science attitude scores of the secondary school students (5th , 6th , 7th ,8th grades). It might be due to the fact that there is a coeducation system in our country and teachers try to educate the students regardless of their gender. The results of other studies which investigated the relation between the attitude scores and gender also resembled each other. According to the study of (Serin, Kesercioğlu, Saracaoğlu, & Serin, 2003) gender

had no significant effect on the students' attitude towards science in 4th grade students in department of primary school teaching and science teaching. According to the results of the studies carried out by (Ersoy & Ergün, 2014) with 512 primary school teaching students in Turkey, Netherlands and Romania and by (Elkonca, Şevgin & Ceyhan, 2014) with 605 secondary school students, gender factor had no effect on the students' attitude toward science. (Akman, İzgi, Bağçe & Akıllı, 2007) and (Turhan, Aydoğdu, Şensoy & Yıldırım, 2008) stated in their studies that there was no significant difference between the Science attitude scores and gender variable. (Can & Dikmentepe, 2015) stated that there was no significant difference between the students' attitude to science and technology and science experiments in terms of gender. (Kaya & Böyük, 2011) concluded that gender had no significant and meaningful effect on the second stage primary education students' attitude against science and technology classes and science experiments. (Böyük, Koç, Erol & Engin, 2013) stated that the second stage primary education students' attitude against science and their future planning were not influenced by gender variable. (Can & Şahin, 2015) studied the preschool teacher candidates' attitude towards science and science teaching and found no significant relation between their science attitude and gender.
There is no statistically significant difference between the science course attitude scores of the 6th grade secondary school students and mother's profession (p>.05). In fact, it can be said that the scores of the students were nearly the same with each other. From this finding, we can conclude that the science course attitude scores of the 6th grade secondary school students were not affected from mother's profession. Even though it does not a have statistical significance, the students whose mothers are teacher had relatively higher science course attitude scores compared to the students whose mothers are from other occupational groups. The average science course attitude scores of the 6th grade secondary school students didn't differentiate significantly depending on father's professions (p>.05). From this finding, we can conclude that the science course attitude scores of the 6th grade secondary school students are not affected from father's profession. Although it is not statistically significant, the students whose fathers are teacher had relatively higher science course attitude scores compared to the students whose fathers are from other occupational groups. There are some similar studies in literature. For instance, according to the study of (Serin et al., 2003) parental professions of the students didn't affect their attitude towards science course in 4th grade students in department of primary school teaching and science teaching. (Güden & Timur, 2016) said in their study that father's professions did not effect the attitude of the 6th grade secondary school students. Although parents experience so many difficulties in their occupation life, they usually prefer not reflecting such negative aspects of their profession to their children and such an approach might have prevented the students' attitude towards science course from being affected negatively. The students' developing positive attitude towards science course might also be due to the fact that the parents encourage their children or helping them in science activities.
The average science course attitude scores of the 6th grade secondary school students varied significantly depending on the number of the books they read in a week (p>.05). It can be concluded from this finding that the number of the books read by students weekly had a significant effect on the students' science course attitude scores. It was observed that as the number of the books read by the students increased, their average science course attitude scores increased as well. It can be explained by the today's students' being more aware of the importance of reading book.
We made simple correlation analysis in order to determine whether there is a significant relation between the average science course attitude scores the students get and being interested in science course. As a result of the data analysis, we found out that there was a significant and positive relation between the average science course attitude scores the students got and being interested in science course (p<.01). This result shows that the students who are interested in science course had higher science course attitude scores from the questionnaire. We concluded from the study that science course interest had a significant effect on students' developing positive attitude towards science course. (Yenice & Saydam, 2010) concluded in their study that 8th grade students had high attitude scores. According to the study of (Serin et al., 2003) , 4th grade students in department of science teaching had positive attitude against science course. According to the study of (Güden & Timur, 2016), secondary school students had considerably high attitude against science course.
The suggestions that we can make as a result of the study might be as follows:
Further studies should be carried out to study demographic characteristics.
Science course contents should be enriched with interesting activities in order to improve the students' attitude toward science.

The contents of science course should be associated with other disciplines in such a way that they can improve the students' attitude toward science course.

REFERENCES

Akgün, Ş. (2004). *Fen bilgisi öğretimi*. Ankara: Nasa Yayınları.

Akman, B., İzgi, Ü., Bağçe, H., & Akıllı, H. İ. (2007). İlköğretim öğrencilerinin fen'e karşı tutumlarının sınav kaygı düzeylerine etkisi. *Eğitim ve Bilim Dergisi, 32* (146), 3-11.

Bakırcı, H. (2010). Üniversiteler düzeyinde fen bilgisi öğretmen adaylarının branşlara (fizik- kimya- biyoloji) karşı tutumlarının incelenmesi. *Yüzüncü Yıl Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 15* (1), 75-81.

Baran, B. (2013). *Bilim tarihi ve felsefesi öğretim metodunun fen bilimlerine yönelik tutum ve motivasyon üzerine etkisi* (Yüksek lisans tezi). Gaziosmanpaşa Üniversitesi , Tokat.

Bozdoğan, A. E., & Yalçın, N. (2005). İlköğretim 6., 7. ve 8. sınıf öğrencilerinin fen bilgisi derslerindeki fizik konularına karşı tutumları**.** *Gazi Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 6* (1), 241-247.

Böyük, U., Koç, A., Erol M., & Engin S. (2013). İlköğretim ikinci kademe öğrencilerinin bilim ve teknolojiye yönelik tutumları ve gelecekle ilgili planları. *Erciyes Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 29* (2), 178-184.

Buluş Kırıkkaya E. (2011). "Grade 4 to 8 primary school students' attitudes towards science: science enthusiasm". *Educational Research and Reviews, 6* (1), 374-382.

Büyüköztürk, Ş. (2008). *Sosyal bilimler için veri analiz el kitabı*. Ankara: Pegem Yayınevi.

Can, M., & Çiğdem Ş. (2015). Okul öncesi öğretmen adaylarının fene ve fen öğretimine yönelik tutumlarının incelenmesi, *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 15* (2), 13-26.

Can, Ş. & Dikmentepe, E. (2015). Ortaokul öğrencilerinin fen ve teknoloji dersi ile fen deneylerine yönelik tutumlarının araştırılması (Muğla ili örneği). *MSKU Eğitim Fakültesi Dergisi MSKU Journal of Education, 2* (1), 44-58.

Ersoy, Ö., & Ergün, M., (2014). Sınıf öğretmenliği adaylarının fen bilimlerine karşı tutumları: Türkiye, Hollanda ve Romanya örneği. *Türk Fen Eğitimi Dergisi, 11* (2), 85-109.

Güden, C., & Timur, B. (2016**).** Ortaokul öğrencilerinin fen bilimlerine yönelik tutumlarının bazı değişkenlere göre incelenmesi (Çanakkale örneği*). International Journal of Active Learning (IJAL*), *1* (1), 49-72.

İşman A., Baytekin Ç., Balkan, F., Horzom, M. B., & Kıyıcı M. (2002). Fen bilgisi eğitimi ve yapısalcı yaklaşım. *The Turkish Online Journal of Educational Technology -TOJET ,1* (1): 47-53.

Kaiser, H. F. (1974). An ındex of factorial simplicity, *Psychometrika, 39* (1), 31-6.

Karakoç, T., (2016). *Görme yetersizliği olan öğrencilerin araştırmaya dayalı öğrenme yaklaşımı modellerinden rehberli keşfetme modelinin deneysel işlem becerilerine, akademik başarılarına ve fen bilimleri dersine yönelik tutumlarına etkisi* (Doktora tezi). Gazi Üniversitesi, Ankara.

Karasar, N. (2009). *Bilimsel Araştırma Yöntemi*. Adana: Nobel Yayın Dağıtım

Kaya, H., & Böyük, U. (2011). İlköğretim II. kademe öğrencilerinin fen ve teknoloji dersine ve fen deneylerine karşı tutumları, *Tübav Bilim Dergisi, 4* (2), 120-130.

Kayri, M., Elkonca, F., Şevgin, H., & Ceyhan, G., (2014). Ortaokul öğrencilerinin fen ve teknoloji dersine yönelik tutumlarının CHAID analizi ile incelenmesi*. Eğitim Bilimleri Araştırma Dergisi, 4* (1), 301- 316.

Kozcu Çakır, N. Şenler, B., & Göçmen Taşkın, B. (2007*).* İlköğretim II. kademe öğrencilerinin fen bilgisi dersine yönelik tutumlarının belirlenmesi. *Türk Eğitim Bilimleri Dergisi, 5* (4), 637- 655.

MEB, (2004). *İlköğretim fen ve teknoloji dersi 4. ve 5. sınıf öğretim programı*, Ankara.

MEB, (2012). *İlköğretim fen ve teknoloji dersi (6, 7 ve 8. sınıflar) öğretim programı,* Ankara.

MEB**,** (2013). *Ortaokul matematik dersi (5, 6, 7 ve 8. sınıflar) öğretim programı*, Ankara.

Moralar**,** A., (2012). *Fen eğitiminde probleme dayalı öğrenme yaklaşımının akademik başarı, tutum ve motivasyona etkisi* (Yüksek Lisans Tezi). Trakya Üniversitesi, Edirne.

Serin, O., Kesercioğlu, T., Saracaoğlu, A. S., & Serin, U. (2003). Sınıf öğretmenliği ve fen bilgisi öğrencilerinin fen bilimlerine yönelik tutumları. *M.Ü. Atatürk Eğitim Fakültesi Eğitim Bilimleri Dergisi, 17* (17), 75-86.

Sinan, O., Şardağ, M., Salifoğlu, A., Çakır, C., & Karabacak Ü. (2014). İlköğretim öğrencilerinin fen tutumları ve özyeterliliklerinin incelenmesi. *Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi (EFMED), 8* (1), 68-100.

Şeker**,** F., (2012). *İlköğretim fen ve teknoloji dersinde tamamlayıcı ölçme ve değerlendirme yaklaşımlarının tutum ve başarıya etkisi* (Yüksek lisans tezi). Akdeniz Üniversitesi, Antalya.

Tavşancıl, E. (2002). *Tutumların ölçülmesi ve spss ile veri analizi*. Ankara: Nobel Yayınları.

Tezcan, G., (2011). *6. Sınıf fen ve teknoloji dersi öğretim programı ünite konularına yönelik bilimsel süreç becerileri testinin geliştirilmesi* (Yüksek lisans tezi). Çanakkale Onsekiz Mart Üniversitesi, Çanakkale.

Turhan, F., Aydoğdu, M., Şensoy, Ö. ve Yıldırım, H. İ., (2008). İlköğretim 8. sınıf öğrencilerinin bilişsel gelişim düzeyleri, fen bilgisi başarıları, fen bilgisine karşı tutumları ve cinsiyet değişkenleri arasındaki ilişkinin incelenmesi. *Kastamonu Eğitim Dergisi, 16* (2), 439-450.

Yaygın, S., & Sidekli, S. (2014**)**. Öğrencilerin fen ve teknoloji dersine karşı tutumlarındaki değişim: bir yıllık takip. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, *16* (2), 121-140.

Yenice, N., & Saydam, G. (2010). 8th grade students' science attitudes and views about nature of scientific knowledge. *Journal of Qafquz University*, *29* (1), 89-97.

TÜRKÇE GENİŞLETİLMİŞ ÖZET

Bireylerin çalışmaları sonucu edinilen bilgi birikimleri dünyayı anlamayı, teknolojiye ayak uydurmayı, problem çözmeyi ve yaşam kalitesini arttırmayı sağlamaktadır (Tezcan, 2011). İçinde bulunduğumuz çağ yeni şeyler keşfetmeyi ve bilgiyi arttırmayı gerektirmektedir. Gelişen teknolojinin temelinin atıldığı alan ise fen bilimleridir (İşman, Baytekin, Balkan, Horzom, & Kıyıcı, 2002).

Günlük dilde inanç, görüş ve tutum kelimeleri birbiriyle karıştırılarak, bazen de biri diğerinin yerine geçmek üzere kullanılmaktadır. Tutumlar üzerindeki araştırmalar ilerledikçe tutum kavramı daha kesin bir anlam kazanmış, tanımında da değişiklikler olmuştur. Tutum, öğrenen bireylerin istendik yönde hedeflere ulaşmasını sağlayan önemli duyuşsal öğelerden biridir. Zira öğrenme yaşantılarının planlanmasında ilgi ve akademik özgüven kadar tutumların da dikkate alınması gerekmektedir. Fen bilimleri eğitimi alan öğrencilerin çevreleri ve dünyayla aktif bir biçimde ilgilenen, anlamlı sorular sorup gözlem ve deneylerle veriler toplayan ve bunları analiz edebilen, edindikleri bilgileri söz ve yazıya dökerek başkalarıyla uygarca iletişim kurabilen, sorumlu davranan ve sorumluluklarının bilincinde, bilgili ve yetenekli bireyler olarak yetiştirilmesi; onların yeterli düzeyde fen alanında okur-yazar bireyler hâline gelmesi ile mümkündür (Akgün, 2004). Fen alanında okur-yazar bireylerin bu niteliklere sahip olması; fen konularına karşı ilgi duymaları ve olumlu tutum geliştirmeleriyle sağlanabilir (Kozcu Çakır, Şenler, & Göçmen Taşkın, 2007). Tutumların olumlu olması durumunda birey yaptığı işten doyum alır (Bakırcı, 2010).

Fen bilimleri eğitiminin temel amaçlarından bir diğeri de, fen bilimleri dersine yönelik olumlu tutum sergileyen bireyler yetiştirmektir. Çocuklarda fen bilimleri dersine yönelik olumlu tutum kazandırılması açısından fen bilimleri dersinin okullarda erken verilmeye başlanması önemlidir. Fen bilimleri dersinde öğrencilerin bilim insanı gibi düşünmelerine ve bilim insanı gibi çalışmalarına ortam sağlanabilir. Bu sayede öğrencilerin bilimsel süreç becerileri geliştirilerek bilimsel çalışmalara ve fen bilimleri dersine olumlu tutum geliştirmesi sağlanabilir (Baran, 2013). (Buluş Kırıkkaya 2011) 'ya göre olumlu tutumların gelişmesi için çocukluk yaşlarından itibaren fen eğitimine başlanmalıdır. 8-14 yaşları arası fen bilimleri dersine karşı tutumların gelişmesinde kritik dönemdir (Şeker, 2012).

Fen bilimleri dersine yönelik tutumlar öğrencilerin yaşantılarının ürünüdür. Bu nedenle öğrencilerin tutumlarını geliştirmek için kullanılan yaklaşımların boyutları arttırılmalıdır (Moralar, 2012). Öğrencilerin fen bilimleri dersini sevebilmeleri, derse etkin olarak katılabilmeleri için zengin materyallerle, araştırma becerilerinin kullanıldığı, yaparak yaşayarak öğrenme etkinlikleriyle ders ortamı sağlanması derse karşı olumlu tutumu etkilemektedir (Karakoç, 2016).

Fen bilimleri dersi çoğunlukla soyut kavramlardan oluşan bir derstir. Kavramların soyut olması öğrencilerin dersi anlamada zorluk çekmelerine neden olmaktadır. Öğrenme sürecinde öğrencilerin fen bilimleri dersine yönelik başarılarının zihinsel faktörlerin yanında tutum gibi duyuşsal faktörler de etkilidir.

İnsanların yaşamı daha kolay hale getirmeleri, doğayı ve doğa gerçeklerini gözlemlemeleri ve incelemeleri sonucu ortaya çıkan davranışlar; öğrencilerin fen bilimlerine karşı olumlu tutum kazanması fenin etkili ve bilinçli öğrenilmesi açısından önemlidir (Bozdağan & Yalçın, 2005).

Bu çalışmada ortaokul 6.sınıf öğrencilerinin fen bilimleri dersine yönelik tutumlarının cinsiyet, anne-baba mesleği, haftada okunan kitap sayısı, fen bilimleri dersini sevme değişkenlerine göre farklılık gösterip göstermediğinin belirlenmesi amaçlanmıştır. Araştırmada tarama modeli kullanılmıştır. Araştırmanın örneklemini Kahramanmaraş ili Dulkadiroğlu ilçesine bağlı 2 farklı ortaokulda öğrenim görmekte olan toplam 318 altıncı sınıf öğrencisi oluşturmaktadır. Öğrencilerin fen bilimleri dersine yönelik tutum puanlarının belirlenmesinde çalışma kapsamında araştırmacı tarafından geliştirilen 5' li likert tipi "Fen Bilimleri Dersine Yönelik Tutum Anketi" kullanılmıştır. Fen Bilimleri Dersine Yönelik Tutum Anketi öğrencilerin fen bilimleri dersine yönelik tutumlarını değerlendirmek için geliştirilmiştir. Anket maddeleri fen bilimleri dersi içeriği temel alınarak hazırlanmıştır. Anketten en az 25, en fazla 125

puan alınabilmektedir. Anketten alınan yüksek puanlar öğrencilerin fen bilimleri dersine yönelik olumlu tutuma sahip olduğunu göstermektedir. Çoğunlukla olumlu ifadelerden oluşan anket maddelerinin güvenirlik katsayısı cronbach alpha 0.818 olarak bulunmuştur. Elde edilen bu güvenirlik katsayısı testin güvenirliğinin yüksek olduğunu göstermektedir.

Fen Bilimleri Dersine Yönelik Tutum Anketinin Kaiser- Mayer-Olkin (KMO) değerinin 0.95, Barlett değerinin 11433.3 olduğu görülmektedir. Buna göre sonuçlar, faktör analizinin uygulanabilirliğini ve maddeler arası korelasyonun olduğunu göstermektedir. Araştırma kapsamında öğrencilerin fen bilimleri dersine yönelik tutumlarını değerlendirmek için tek yönlü varyans analizi ve bağımsız örneklemler t testi kullanılmıştır. Araştırmaya katılan 318 öğrencinin Fen Bilimleri Dersine Yönelik Tutum Anketi'ne verdikleri cevapların ortalaması 83.62 bulunmuştur. Bu bulguya göre ortaokul 6.sınıf öğrencilerinin tutum puanlarının oldukça yüksek seviyede olduğu söylenebilir. Araştırmaya 127 kız, 191 erkek öğrenci katılmıştır. Öğrencilerin Fen Bilimleri Dersine Yönelik Tutum anketinden aldıkları puanlar incelendiğinde tutum puanları arasında cinsiyet değişkenine göre anlamlı bir fark olmadığı görülmektedir ($t(316)= 1.395$, $p>.05$). Bu bulguya göre fen bilimleri dersine yönelik tutum puanının cinsiyete göre değişmediği söylenebilir. Anne ve baba mesleği değişkenlerine göre öğrencilerin fen bilimleri dersine yönelik tutumlarının birbirine yakın olduğu söylenebilir. Bu bulguya göre fen bilimleri dersine yönelik tutum puanının anne ve baba mesleğine göre değişmediği söylenebilir. Öğrencilerin haftada okudukları kitap sayısı arttıkça fen bilimleri dersine yönelik tutum puanlarının arttığı görülmektedir.

Çalışmada elde edilen verilerin analizi sonucu, öğrencilerin fen bilimleri dersine yönelik tutum puanları ve bu dersi sevmeleri arasında yüksek düzeyde, pozitif ve anlamlı bir ilişkinin olduğunu göstermiştir. Bu durum fen bilimleri dersini seven öğrencilerin fen bilimleri dersine yönelik tutum puanlarının yüksek olduğunu, fen bilimleri dersini seven öğrencilerin olumlu tutuma sahip olduğunu göstermektedir.

TURJE
www.turje.org

Volume 6 Issue 2

DOI: 10.19128/turje.291015

Turkish Journal of Education
Research Article

Received 09.02.2017
Accepted 02.07.2017

Nature relatedness of pre-service teachers

Ferhat Karakaya
Kahramanmaraş Sütçüimam University, Faculty of Education, Kahramanmaraş, Turkey, ferhatk26@gmail.com
Sakine Serap Avgın
Kahramanmaraş Sütçüimam University, Faculty of Education, Kahramanmaraş, Turkey, serapavgin@hotmail.com
Elif Gömlek
Kahramanmaraş Sütçüimam University, Faculty of Education, Kahramanmaraş, Turkey, elif.gomlek.80@gmail.com
Merve Balık
Kahramanmaraş Sütçüimam University, Faculty of Education, Kahramanmaraş, Turkey, evrem466@gmail.com

ABSTRACT In this research, it was aimed to determine the nature relatedness of pre-service primary school and science teachers regarding various variables. "Nature Relatedness Scale (NRS)", developed by Nisbet, Zelenski and Murphy (2009) and adapted to Turkish and analyzed, terms of validity by Çakır, Kararslan , Şahin and Ertenpınar (2015), was used as data collection instrument. The research was carried out with 363 pre-service teachers in Kahramanmaraş Sütçü İmam University in the academic year of 2015-2016. The relational screening model was used in the research, in which and, statistical significance of the obtained data was determined through independent t test, one-way variance analysis Kruskal-Wallis analysis and Tukey meaningfulness tests. Research findings have indicated a; difference among the participants' nature relatedness in relation to gender, education, and grade level. However, no significant was difference found between having taken the environment lesson, membership to natural organizations, participation in natural activities nature relatedness of pre-service teachers.

Keywords *Nature relatedness, nature education, environmental education, prospective teacher*

Öğretmen adaylarının doğa ile ilişkileri

ÖZ Bu araştırmada, fen bilgisi ve sınıf öğretmenliği programlarında okuyan öğretmen adaylarının doğa ile ilişkilerinin çeşitli değişkenlere göre belirlenmesi amaçlanmıştır. Araştırmada, Nisbet, Zelenski ve Murphy (2009) tarafından geliştirilen Çakır, Karaarslan, Şahin ve Ertepınar (2015) tarafından Türkçeye uyarlanarak geçerlik ve güvenirlik analizleri yapılan ''Doğayla İlişki Ölçeği (DİÖ)'' kullanılmıştır. Çalışma 2015-2016 eğitim öğretim yılında Kahramanmaraş Sütçü İmam Üniversitesinde öğrenim gören 363 öğretmen adayı ile yürütülmüştür. İlişkisel tarama modelinin kullanıldığı araştırmada, elde edilen verilerin istatistiki anlamlılıklarının belirlenmesi bağımsız t testi, tek yönlü varyans analizi Kruskal-Wallis analizi ve Tukey anlamlılık testleriyle yapılmıştır. Araştırma bulgularına göre; cinsiyet, öğrenim görülen bölüm ve sınıf düzeyi öğretmen adaylarının doğayla ilişkilerinde anlamlı farklılık (p<.05) oluşturmuştur. Ancak öğretmen adaylarının doğayla ilişkilerinde çevre dersi alma durumu, doğa kuruluşuna üye olma durumu ve doğa etkinliğine katılma durumu değişkenlerine göre anlamlı farklılık olmadığı tespit edilmiştir.

Anahtar Kelimeler *Doğa ilişkisi, doğa eğitimi, çevre eğitimi, öğretmen adayı*

INTRODUCTION

Nature is a system, which is created without human effect, which has its own mechanisms with no boundaries without showing variability in terms of living and nonliving elements; and which has the characteristics of being effective and effected, changing and able to change, and being renewable (Atasoy, 2006). The fact that the human influences are not felt, or the idea that environment cannot be changed to a great extent comes into human mind when natural environment, natural activities and forces are concerned. In order for human beings to continue their life, they create the artificial environment, which is different from natural one, by using the resources in natural environment, improving technology and realising financial activities. While trying to improve the living conditions of artificial environment, they are always in communication with the nature (Ertan, 1991). Human being is an entity that directs his life through the effects of conditions within nature and can exist necessarily in relation to nature. Human is a living species that has to live in relation to nature. This forced relationship is shaped around human being's own needs and foresights, and s/he chooses the way to centralize his own position from a unilateral attitude to the effect of nature (Gül, 2013). Ever since human beings began to live on earth, they have tried to create an artificial environment of their own, which has caused the relationship between human beings and nature to constantly evolve against nature. There is a constant battle between the natural environment and the artificial environment. While the natural environment is degraded by human, the artificial environment is expanding. (Ertan, 1991). It is necessary to organize education about the subject from the early ages in order to be aware of the growth that occurs in the artificial environment and to develop environmentally sensitive behaviors (Çabuk, 2001).

The majority of human identity occur in the early years of childhood (0-12 years), according to developmental psychology surveys. Stage theorists studied human development in terms of different stages and consequently concluded that childhood characteristics of human development are largely influencing other periods (Onur, 1995). This result in the field of developmental psychology also supports the results of studies in medicine (Çukur & Özgüner, 2008). For example, according to the children meat is sold in the butcher shop, a food from the egg grocery store and Milk, bottles, or carton boxes. Today's people, starting from childhood, are watching dreams that are produced in a way disconnected from the realities of nature, listening to the stories and reading them (Ökten, 1985).

When the literature is analyzed, it is seen that the attitudes of the individuals in different groups towards environment and nature and their relations have been/ were investigated in various forms. Aksoy and Karatekin (2011) examined the affective tendencies of undergraduate students studying in different programs in terms of different variables and revealed. It was determined that the female prospective teacher were higher in this study than the male prospective teacher. Altınöz (2010) conducted a study to reveal the environmental literacy levels of science teacher candidates. As a result of the research, it has been determined that environmental literacy levels of science teacher candidates are moderate. Aydin (2010) conducted a survey to determine geographical teacher candidates' views on environmental issues and education. As a result of the research it is understood that geography teacher candidates' social and academic sensitivity about environment problems and environment education is extremely high. Çabuk and Karacaoğlu (2003) conducted a study on examining the environmental sensitivities of university students. According to the opinions of the students, it has been reached that there is not enough education about air, water and soil pollution in organized education institutions and environmental sensitivities of students according to some personal characteristics. Ek, Kılıç, Öğdüm, Düzgün and Şeker (2009) conducted a study to determine the attitudes and sensitivities of first and last year students in different departments of the university to environmental problems. It has been determined that various variables affect the attitudes and behaviors of university students in preventing environmental problems in the study. Kahyaoğlu, Daban and Yang (2008) investigated the attitudes of the elementary school teachers to the environment and as a result they found that the program they were in possessed different perspectives for the neighborhood in terms of class level. Kayalı (2010) investigated the attitudes of students of social studies, Turkish and classroom teaching to environmental problems. As a result of the research, it was determined that the teacher candidates generally have a positive attitude towards environmental problems. Sam, Gürsakal and Sam (2010) conducted a study to determine the environmental risk perceptions and environmental attitudes of university students. In the study, it was found that the sensitivity of female students to environment was higher than that of male students, the sensitivity increased as the level of the students were higher, have affected the environmental sensitivity

significantly. Sam, Öngen and Sam (2010) investigated whether university students' environmental attitudes are related to their self-esteem. As a result of the study, it was revealed that the average of the environment-centered approach of the female students was higher than the male students, and that there was a positive and meaningful relationship between the students' environmentalist approaches and their self-esteem. Aksu (2009) as a result of the research on science and technology and classroom teachers stated that, most of the teachers think that the sensitivity of the society to the environment is inadequate, the sensitivity of the students is moderate, and their sensitivity is good. Meydan and Doğu (2008) evaluated the opinions of primary school second graders about environmental problems according to some variables. As a result of the study, the students' opinions on environmental problems were changed according to the classes and ages of education and there was no difference according to gender. Nature Relation Scale which is used in this study and developed by Nisbet et al. (2009), is different from other scales developed in the subject, including the physical relationship established with nature such as dealing with the land, being in natural areas and preferring these areas as a holiday place. This scale provides the researcher with the opportunity to evaluate the nature, emotional, cognitive and physical relationships of the individuals together at the same time.

Teachers constitute the core of this education along with the families. The basis of this education is the teachers together with the families. As in every stage of education, it is aimed to educate individuals to be sensitive to the environment and to have a positive environmental attitude from the primary education onwards . In order to provide nature education in an effective and qualified manner in the first stage of primary education, teachers are expected to be well trained in nature education. That is, it is considered beneficial to determine the nature relatedness of pre-service teachers. This aim could only be achieved with qualified teachers who attach sufficient importance to nature education. Accordingly, the aim of the research is outlined in the following subsection.

Aim of the research

In this research, it was aimed to determine the nature relatedness of pre-service primary school and science teachers regarding various variables. Within the scope of this aim, the following research questions were addressed:

Is there a difference in nature relatedness of pre-service teachers in terms of gender?

Is there a difference in nature relatedness of pre-service teachers in terms of having an environment lesson?

Is there a difference in nature relatedness of pre-service teachers in terms of the education department?

Is there a difference in nature relatedness of pre-service teachers in terms of participation in a nature activity?

Is there a difference in nature relatedness of pre-service teachers in terms of being a member of a nature organization?

Is there a difference in nature relatedness of pre-service teachers in terms of grade level?

The following section outlines research design of the study providing information about study group of research, data collection instrument, and data analysis.

METHODOLOGY

Research model

In this research, relational screening model was used to investigate nature relatedness of the pre-service teachers regarding various variables . The screening model is a method that aims to achieve generalized beliefs on a sample selected from the universe or universe consisting of many elements (Karasar, 2006). The relational screening model, on the other hand, is a scanning model that consists of two or more variables and that examines the relationship between variables (Karasar, 2006).

Data collection instrument

As a data collection tool; Nature Relatedness Scale (NRS) developed by Nisbet, Zelenski and Murphy (2009) and adapted to Turkish and analyzed, terms of validity by Çakır, Kararslan , Şahin and Ertenpınar (2015), was used as data collection instrument. The relationship with nature scale consists of three sub-dimensions as "Self-confidence", "Perspective" and "Experience" and a total of 21 questions. Questions on the scale are evaluated by numbering 1 = absolutely disagree, 2 = disagree, 3 = unstable, 4 = agree, 5 = strongly agree. The reliability of this research scale was found to be cronbach alpha number of 0.74.

Data analysis

IBM SPSS 21 Statistics program was used for analyzing the obtained data. In assessment of the items 5-Likert type scoring from "(1) not very important" to "(5) very important" was used. The data were analysed through the Independent Sample t-test, and One-way ANOVA.

Study group of research

The research was carried out with participation of 363 pre-service teachers in Kahramanmaraş Sütçü İmam University in the academic year of 2015-2016. Demographics of the pre-service teachers are presented in Table 1.

Table 1

The demographic information of the pre-service teachers

Demographical Information		f	%
Gender	Female	279	76.9
	Male	84	23.1
Department	Science education	177	48.8
	Primary school education	186	51.2
Grade Level	1st Grade	137	37.7
	2nd Grade	53	14.6
	3rd Grade	53	14.6
	4th Grade	120	33.1
Having a class about nature	Yes	205	56.5
	No	158	43.5
Attending to a nature activity	Yes	172	47.4
	No	191	52.6
Membership to nature organization	Yes	54	14.9
	No	309	85.1
		363	100

When data on Table 1 is analyzed, 76.9% (n=279) of pre-service teachers are females and 23.1% (n=84) of these teachers are males. The finding of the research is described in the following section.

FINDINGS

Within the scope of the aim of research, findings of research questions are presented below. Firstly, in the research, question of *"Is there a difference in nature relatedness of pre-service teachers in terms of gender"* was investigated. The independent t-test results are given in Table 2.

Table 2

The results of t-test for gender variable

Department	Gender	N	$\bar{X}$	sd	*t*	*p*
Science education	Female	147	3.20	175	-2.607	.010*
	Male	30	3.43			
Primary school education	Female	132	3.18	184	3.131	.002*
	Male	54	2.98			

*p<.05

When the the results in Table 2 were examined, there was significant difference nature relatedness of in terms of gender. It could be claimed that gender is an effective factor for nature relatedness of pre-service science teachers ($t(175) = -2.607$; $p<.05$) and pre-service primary school teachers ($t(184) = 3.131$; $p<.05$). Additionally, while female pre-service science teachers mean score of nature relatedness is (x=3.20), mean score of male pre-service science teachers is (x=3.43). When female and male pre-service science teachers mean scores were compared, it can be said that nature relatedness of male pre-service science teachers is less than nature relatedness of female pre-service science teachers. While female pre-service primary school teachers mean score of nature relatedness is (x=3.18), mean score of male lecturers is (x=2.98). When female and male pre-service primary school teachers mean scores were compared, it can be said that nature relatedness of male pre-service primary school teachers is less than nature relatedness of female pre-service primary school teachers.

In the research, question of ‘‘*Is there a difference in nature relatedness of pre-service teachers in terms of having an evironment lesson?*’’ was investigated. The independent t-test results were given in Table 3.

Table 3
The results of t-test for having an environment lesson variable

Department	Having an environment lesson	N	$\bar{X}$	sd	*t*	*p*
Science education	Yes	107	3.28	175	1.596	.112
	No	70	3.17			
Primary school education	Yes	98	3.08	184	-1.568	.119
	No	88	3.17			

*p<.05

When the the results in Table 3 were examined, there was no significant difference nature relatedness of in terms of having an environment lesson . It could be claimed that having an environment lesson is not an effective factor for nature relatedness of pre-service science teachers (t(175) = 1.596; p>.05) and pre-service primary school teachers (t(184) = -1.568; p>.05).
In the research, question of ‘‘*Is there a difference in nature relatedness of pre-service teachers in terms of education department?*’’ was investigated. The independent t-test results were given in Table 4.

Table 4
The results of t-test for education department variable

Scale	Department	N	$\bar{X}$	sd	*t*	*p*
NRS	Science education	177	3.24	361	2.579	.01*
	Primary school education	186	3.12			

*p<.05

When the the results in Table 4 were examined, there was a significant difference nature relatedness of in terms of education department (t(361) = 2.579, p<.05). It could be claimed that education department is an effective factor for nature relatedness of pre-service science teachers and pre-service primary school teachers. Additionally, while pre-service science teachers mean score of nature relatedness is ($\bar{X}$=3.24), mean score of pre-service primary school teachers is ($\bar{X}$=3.12). When pre-service science teachers and pre-service primary school teachers mean scores were compared, it can be said that nature relatedness of pre-service primary school teachers is less than nature relatedness of pre-service science teachers.
In the research, question of “*Is there a difference in nature relatedness of pre-service teachers in terms of participation in a nature activity?”* was investigated. The independent t-test results were given in Table 5.

Table 5
The results of t-test for participation in a nature activity variable

Department	Attendance to an Act.	N	$\bar{X}$	sd	*t*	*p*
Science education	Yes	96	3.24	175	.143	.887
	No	81	3.23			
Primary school education	Yes	76	3.06	184	-1.345	.180
	No	110	3.17			

*p<.05

When the the results in Table 5 were examined, there was not significant difference nature relatedness of in terms of participation in a nature activity. It could be claimed that participation in a nature activity is not an effective factor for nature relatedness of pre-service science teachers (t(175) = .143; p>.05) and pre-service primary school teachers (t(184) = -1.345; p>.05).
In the research, question of “*Is there a difference in nature relatedness of pre-service teachers in terms of being a member of a nature organization?’’* was investigated. The independent t-test results were given in Table 6.

Table 6
The results of t-test for being a member of a nature organization variable

Department	Membership	N	$\bar{X}$	sd	*t*	*p*
Science education	Yes	25	3.36	175	1.495	.137
	No	152	3.22			
Primary school education	Yes	29	3.06	184	-.924	.357
	No	157	3.13			

*p<.05

When the the results in Table 6 were examined, there was not significant difference nature relatedness of in terms of participation in a nature activity. It could be claimed that being a member of a nature organization is not an effective factor for nature relatedness of pre-service science teachers (t (175) = 1.495; p>.05) and pre-service primary school teachers (t(184) = -.924; p>.05).
In the research, question of *''Is there a difference in nature relatedness of pre-service teachers in terms of grade level?''* was investigated. The obtained one-way analysis of variance (anova) results were given in Table 7 and Kruskal-Wallis results were provided on Table 8.

Table 7
The results of one-way ANOVA test for grade level variable

	Grade	f	$\bar{X}$	Squares Sum	sd	Squares Average	*F*	*p*	Tukey	
Primary school education	1st	90	3.21	Between Groups	1.473	3	.491	2.937	.035*	1>2
	2nd	26	2.99	In Groups	30.428	182	.167			
	3rd	32	3.06	All	31.901	185				
	4th	38	3.05							

**p<.05

When the the results in Table 7 were examined, there was significant difference nature relatedness of in terms of grade level. It can be said that grade level is an effective factor for nature relatedness of pre-service primary school teachers' [F(3,182) = 2.937; p<.05]. Additionally, while 1st grade pre-service primary school teachers mean score of nature relatedness is ($\bar{X}$=3.21), mean score of 2nd grade pre-service primary school teachers' is ($\bar{X}$=2.99). When 1st and 2nd pre-service primary school teachers' mean scores were compared, it can be said that nature relatedness of 2nd pre-service primary school teachers'is less than nature relatedness of 1st pre-service primary school teachers.

Table 8
The results of kruskal- wallis variance analysis test for grade level variable

	Grade	N	$\bar{X}$	Sıra Ort.	Sd	X^2	*p*
Science education	1st	47	3.13	80.21			
	2nd	27	3.26	98.13	2	2.942	.401
	3rd	21	3.17	82.95			
	4th	82	3.31	9258			
All		177	3.24				

*p<.05

When the the results in Table 8 were examined, there was not significant difference nature relatedness of in terms of grade level. It could be claimed that grade level is not an effective factor for nature relatedness of pre-service science teachers (X^2 = 14,375; p>.05).

DISCUSSION and CONCLUSION

In this research, it was aimed to determine the nature relatedness of pre-service primary school and science teachers regarding various variables.
There was statistically significant difference nature relatedness of pre-service science teachers and primary school teachers in terms of gender. That is, gender is an effective factor on nature relatedness

of pre-service science teachers and pre-service primary school teachers. When female and male pre-service primary school teachers mean scores were compared (Table 2), it can be said that nature relatedness of male pre-service primary school teachers is less than nature relatedness of female pre-service primary school teachers. Similar to this finding, Kahyaoğlu, Daban ve Yangın (2008) found that an environmental attitudes of male pre-service primary school teachers is less than female pre-service science teachers. Meydan and Doğu (2008), Ek and others (2009), Erol and Gezer (2006) found that attitudes towards environmental problems are higher for women. These results support the findings of this research. On the contrary, this research was found that male pre-service science teachers have more nature relatedness of levels compared to female pre-service science teachers. This is an interesting result.

There was no statistically significant difference in nature relatedness of pre-service science teachers' and pre-service primary school teachers in terms of having an environment lesson. That is, having an environment lesson is not an effective factor on nature relatedness of pre-service science teachers and pre-service primary school teachers. However, it is interesting that environment lesson effect positive on nature relatedness of pre-service science teachers. On the contrary, it found that environment lesson effect negative on nature relatedness of pre-service primary school teachers. Similar to this finding, Aksoy and Karatekin (2011) found that the environmental education courses that prospective teachers had taken in the university did not have a positive effect on their environmental perception tendencies. Erol and Gezer (2006), Kahyaoğlu and et al. (2008) found that there was no significant difference in the affective tendencies of students who took environmental education courses. On the contray these results, Kayalı (2010), Altınöz (2010), Sam, Gürsakal and Sam (2010) found that the attitudes of pre-service teachers who had environment lessons before towards the environment are higher than pre-service teachers who did not see the environment lessons.

There was a statistically significant difference nature relatedness of prospective science teachers and primary school teachers in terms of education department. That is, education department is an effective factor on nature relatedness of pre-service teachers. Similar to this finding, Aksoy and Karatekin (2011) determined that the nature relatedness of pre-service primary school teachers and social studies teachers is less than nature relatedness of pre-service science teachers. Çabuk and Karacaoğlu (2003), Aksu (2009), Kahyaoğlu and et al. (2008) found that education department is an effective factor on environmental attitudes, environmental sensitivities of pre-service teachers. These results support the findings of this research.

There was no statistically significant difference nature relatedness of pre-service science teachers and pre-service primary school teachers in terms of participation in a nature activity. That is, participation in a nature activity is not an effective factor on nature relatedness of pre-service science teachers and pre-service primary school teachers. However it was found that participation in a nature activity affect negatively the nature relatedness of pre-service primary school teachers.

There was no statistically significant difference nature relatedness of pre-service science teachers and pre-service primary school teachers in terms of being a member of a nature organization. That is, being a member of a nature organization is not an effective factor for nature relatedness of pre-service science teachers and pre-service primary school teachers. However it was found that being a member of a nature organization effect negatively the nature relatedness of pre-service primary school teachers.

There was statistically significant difference in nature relatedness of pre-service primary school teachers in terms of grade level. When 1st grade and 2nd pre-service primary school teachers mean scores were compared (Table 7), it can be said that nature relatedness of 2nd pre-service primary school teachers is less than nature relatedness of 1st pre-service primary school teachers. That is, grade level is an effective factor on nature relatedness of pre-service primary school teachers. Similar to this finding, Ek et al. (2009) found that the average of senior students was higher by examining the relationship between environmental attitudes and grade levels of students who were studying at university. These result support the findings of this research. However, there was no statistically significant difference nature relatedness of pre-service science teachers in terms of grade level. Aydın (2010) and Sam and Öngen (2010) found that the grade level is not effective on environmental attitudes in their studies.

This research has determined the nature relatedness of pre-service teachers by different variables. It showed that nature relatedness of pre-service teachers were not at an adequate level. It were found that studies and activities were needed to increase the nature relatedness of pre-service teachers. Further, it was considered that nature relatedness of pre-service teachers should be examined according to

independent variables. Because teachers have great responsibilities not only in education but also in different discipline (social, moral, environmental, etc). Teachers are engaged in the training of environmentally sensitive individuals and societies. Therefore, nature relatedness of pre-service teachers should be strongly.

Acknowledge: Some findings of this research was presented as an oral paper at the 3rd National Environmental Congress 24- 28 Eylül 2016, Marmaris, Turkey.

REFERENCES

Aksoy, B., & Karatekin, K. (2011). Farklı programlardaki lisans öğrencilerinin çevreye yönelik duyuşsal eğilimleri. *Türkiye Sosyal Araştırmalar Dergisi, 15*(3), 23-36.

Aksu, Y. (2009). *Fen ve Teknoloji ile sınıf öğretmenlerinin çevre sorunlarına yönelik tutumlarının belirlenmesi (Burdur İli Örneği).* Süleyman Demirel Üniversitesi, Yayımlanmamış yüksek lisans tezi, , Isparta.

Altınöz, N. (2010). *Fen Bilgisi öğretmen adaylarının çevre okuryazarlık düzeyleri*. Sakarya Üniversitesi, Yayımlanmamış Yüksek Lisans Tezi, Sakarya.

Atasoy, E. (2006). Çevre İçin Eğitim: Çocuk-Doğa Etkileşimi. Ezgi Kitabevi.

Aydın, F. (2010). Coğrafya öğretmen adaylarının çevre sorunları ve çevre eğitimi hakkındaki görüşleri (Gazi Üniversitesi Örneği). *International Online Journal of Educational Sciences, 2*(3), 818-839.

Çabuk, B. (2001). *Okul öncesi dönem çocuklarının çevre ile ilgili farkındalık düzeyleri*. Ankara Üniversitesi, Yayınlanmamış Yüksek Lisans Tezi, Ankara.

Çabuk, B., & Karacaoğlu, C. (2003). Üniversite öğrencilerinin çevre duyarlılıklarının incelenmesi. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi, 36*(1-2), 189-198.

Çakır, B., Karaarslan, G., Şahin, E., & Ertepınar, H. (2015). Adaptation of nature relatedness scale to Turkish. *Elementary Education Online, 14*(4), 1370-1383.

Çukur, D., & Özgüner, H. (2008). Kentsel alanda çocuklara doğa bilinci kazandırmada oyun mekanı tasarımının rolü. *Süleyman Demirel Üniversitesi Orman Fakültesi Dergisi*, (2), 177-187.

Ek, N., H., Kılıç, N., Öğdüm, P., Düzgün, G. ve Şeker, S. (2009). Adnan Menderes Üniversitesinin farklı akademik alanlarında öğrenim gören ilk ve son sınıf öğrencilerinin çevre sorunlarına yönelik tutumları ve duyarlılıkları. *Kastamonu Eğitim Dergisi, 17*(1), 125-136.

Erol, H. G. & Gezer, K. (2006). Prospective of elementary school teachers' attitudes toward environment and environmental problems, *International Journal of Environmental and Science Education, 1*(1), 65 – 77.

Ertan, B. (1991). *Türkiye'de çevre hakkının gelişimi*. Ankara Üniversitesi, Yayınlanmamış Yüksek Lisans Tezi, Ankara.

Gül, F. (2013). İnsan-doğa ilişkisi bağlamında çevre sorunları ve felsefe. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (14), 17-21.

Kahyaoğlu, M., Daban, Ş. & Yangın S. (2008). İlköğretim öğretmen adaylarının çevreye yönelik tutumları. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, (11), 42-52.

Kayalı, H. (2010). Sosyal bilgiler, Türkçe ve sınıf öğretmenliği öğretmen adaylarının çevre sorunlarına yönelik tutumları, *Marmara Coğrafya Dergisi*, (21), 258-268.

Meydan, A., & Doğu, S. (2008). İlköğretim ikinci kademe öğrencilerinin çevre sorunları hakkındaki görüşlerinin bazı değişkenlere göre değerlendirilmesi, *Selçuk Üniversitesi Ahmet Keleşoğlu Eğitim Fakültesi Dergisi*, (26), 267-277.

Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2008). The nature relatedness scale: linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, *41*(5), 715-740.

Onur, B. (1995). Gelişim psikolojisi. İmge Kitabevi, Ankara, 152.

Sam, N., Gürsakal, S., & Sam, R. (2010). Üniversite öğrencilerinin çevresel risk algısı ve çevrese tutumlarının belirlenmesi. *Akademik Bakış Uluslararası Hakemli Sosyal Bilimler E Dergisi*, (20), 1-16.

Sam N.**,** Sam R., & Öngen B. K. (2010). Üniversite öğrencilerinin çevresel tutumlarının yeni çevresel paradigma ve benlik saygısı ölçeği incelenmesi. *Akademik Bakış Uluslararası Hakemli Sosyal Bilimler E Dergisi*, (21), 1-16.

TÜRKÇE GENİŞLETİLMİŞ ÖZET

Doğa canlı ve cansız unsurlar bakımından çeşitlilik gösteren; etkileyen ve etkilenen, değiştiren ve değişebilen, yenilenebilme özelliklerine sahip; insan etkisi dışında oluşmuş; kendi mekanizmaları olan; sınırları kesinlik taşımayan açık bir sistemdir (Atasoy, 2006). Doğal çevre denildiğinde içinde doğa etkinliklerinin ve doğa güçlerinin oluştuğu, insan etkilerinin görülmediği veya önemli ölçüde değiştirilemeyen çevre akla gelmektedir. İnsanlar yaşamlarını devam ettirebilmek için doğal çevredeki kaynakları kullanarak, teknolojiyi geliştirerek, ekonomik etkinliklerde bulunarak doğal çevreden farklı olan yapay çevreyi oluştururlar. Yapay çevre içindeki yaşam koşullarını geliştirmeye çalışırken de doğa ile sürekli bir etkileşim içerisindedirler (Ertan, 1991). İnsan, yaşamını doğa içindeki koşulların etkisiyle yönlendiren ve mecburi olarak da doğayla ilişki içerisinde var olabilen bir varlıktır. Doğa, kendisi gibi canlı bir varlık olan insanla sürekli birlikte olmayı gerektirecek bir unsur olarak karşımıza çıkmaktadır. Bu zorunlu ilişki, insanın kendi ihtiyaçları ve öngörüleri etrafında şekillenmekte ve doğanın etkisini tek taraflı bir tutumla görmezden gelen insan kendi konumunu merkezileştirme yolunu seçmektedir (Gül, 2013). İnsan yeryüzünde yaşamaya başladığından bu yana kendisine ait yapay çevre oluşturmaya çalışmıştır, bu da insan ve doğa arasındaki ilişkinin sürekli doğa aleyhinde gelişmesine neden olmuştur. Doğal çevre ve yapay çevre arasında sürekli bir savaş söz konusudur. Doğal çevre günden güne daralırken, yapay çevre de sürekli büyüme çabasındadır (Ertan, 1991). Yapay çevrede meydana gelen büyümenin bireylere fark ettirilmesi ve çevreye duyarlı davranışlar geliştirilmesi için küçük yaşlardan itibaren konu ile ilgili eğitim verilmesi gerekmektedir (Çabuk, 2001). İnsan kimliğinin büyük bölümü, gelişim psikolojisi araştırmalarına göre çocukluk döneminin (0-12 yaş) ilk yıllarında oluşmaktadır. Evre kuramcıları (Sigmund Freud, Erik Erikson, Jean Piaget vb.) insan gelişimini evrelere ayırarak incelemişler ve sonuç olarak insan gelişiminin büyük oranda tamamlandığı çocukluk dönemindeki özelliklerinin diğer dönemleri etkilediği konusunda görüş birliğine varmışlardır (Onur, 1995). Gelişim psikolojisi alanında varılan bu sonucu, beyin bilimi alanında yapılan çalışma sonuçları da desteklemektedir (Çukur ve Özgüner, 2008). Çocukluk döneminden itibaren alınmaya başlanan doğa eğitimi konusuna verilen önem günümüzde giderek artmaktadır. Doğa eğitiminin ilköğretimin ilk kademesinde etkili ve nitelikli bir biçimde verilmesi için öğretmenlerin doğa eğitimi konusunda iyi yetişmiş olmaları gerekmektedir Birkaç yıl sonra ilköğretim öğrencilerini yetiştirecek olan öğretmen adaylarının nasıl bir doğa eğitimi verebileceklerini görmek için de öncelikli olarak doğayla ilişkilerinin belirlenmesinde yarar vardır. Bu araştırmada, öğretmen adaylarının doğayla ilişkileri çeşitli değişkenler açısından incelenerek ortaya konulmaya çalışılmıştır. Araştırmanın çalışma grubunu fen bilgisi ve sınıf öğretmenliği anabilim dalında öğrenim gören toplamda 363 öğretmen adayı oluşturmaktadır. Veri toplama aracı olarak ‘‘Doğayla İlişki Ölçeği (DİÖ)’’ kullanılmıştır. Araştırma bulgularına göre; cinsiyet, öğrenim görülen bölüm ve sınıf düzeyi öğretmen adaylarının doğayla ilişkilerinde anlamlı farklılık ($p<0.05$) oluşturmuştur. Ancak öğretmen adaylarının doğayla ilişkilerinde çevre dersi alma durumu, doğa kuruluşuna üye olma durumu ve doğa etkinliğine katılma durumu değişkenlerine göre anlamlı farklılık olmadı tespit edilmiştir. Öğretmenlerin sadece öğretim alanında değil her alanda (eğitim, toplumsal, ahlaki, çevre, vb.) büyük sorumlulukları vardır. Çevreye duyarlı bireylerin olduğu toplumların oluşmasında aile ve öğretmenlerin atacağı temeller büyük önem taşımaktadır. Bu yüzden geleceğin öğretmenleri olacak öğretmen adaylarının doğayla olan ilişkilerinin güçlendirilmesi gerekmektedir. Fen Bilgisi ve Sınıf öğretmenliği programında öğrenim gören öğretmen adaylarının doğaya karşı farkındalıklarını artıracak etkinlik ve çalışmaların daha fazla yapılması gerekmektedir. Ayrıca öğretmen adaylarının doğayla olan ilişkileri farklı bağımsız değişkenlere göre incelenmesi gerektiği düşünülmektedir.

TURJE
www.turje.org

Volume 6 Issue 2

DOI: 10.19128/turje.306499

Turkish Journal of Education
Research Article

Received 15.04.2017
Accepted 02.07.2017

Emotional intelligence in engineering education

Mehmet Tekerek
Kahramanmaraş Sütçüimam University, Computer Education and Instructional Technology Department, Kahramanmaraş, Turkey, tekerek@ksu.edu.tr
Betül Tekerek
Kahramanmaraş Sütçüimam University, Mathematics and Science Education Department, Kahramanmaraş, Turkey, btekerek@ksu.edu.tr

ABSTRACT In this study, emotional intelligence levels of engineering students from different universities in Turkey were investigated. Data were collected by "Emotional Intelligence Scale" developed by Schutte and et al (1998). 98 engineering students from different engineering faculties were selected as the participants of the study. The participants participated in the TUBITAK Alternative Energy Car Races before the study. Findings of the study showed that there is no significant difference in students' emotional intelligence scores in terms of age and gender. Additionally, the students who have similar hobbies regarding developing design had higher emotional intelligence score. In terms of being engineer in the family, students showed higher performance in emotional intelligence score. Students who don't have professional pessimism have higher emotional intelligence score.

Keywords *Engineering Education, STEM Education, Emotional Intelligence*

Mühendislik eğitiminde duygusal zeka

ÖZ Bu araştırmanın amacı, TUBITAK Alternatif Enerjili Araba Yarışları'na katılan ve Türkiye'nin farklı üniversitelerinin mühendislik fakültelerinde öğrenim görmekte olan öğrencilerin duygusal zeka düzeylerini cinsiyet, yaş, günlük hayatta tasarım geliştirmeyle benzer hobisi olma, ailesinde mühendis olma durumu ve mesleki kötümserlik gibi değişkenler açısından incelemektir. Bu amaçla yapılan çalışmada tarama modeli kullanılmıştır. Elde edilen veriler Schutte ve Ark.'ı (1998) tarafından geliştirilen "Duygusal Zeka Ölçeği" aracılığıyla mühendislik fakültelerinde eğitim gören 98 öğrenciden toplanmıştır. Bulgular öğrencilerin duygusal zeka puanlarında yaş ve cinsiyet açısından önemli bir farklılık olmadığını göstermiştir. Ayrıca tasarım geliştirmeye yönelik benzer hobisi olan, ailesinde mühendis olan, ve mesleki kötümserlik sahibi olmayan öğrencilerin duygusal zeka puanlarının diğerlerine göre daha yüksek olduğu ortaya çıkmıştır.

Anahtar Kelimeler *Mühendislik Eğitimi, STEM Eğitimi, Duygusal Zeka*

INTRODUCTION

Emotional Intelligence (EI) was defined in Psychology Today (2016) as; "Emotional intelligence is the ability to identify and manage your own emotions and the emotions of others. It is generally said to include three skills: emotional awareness; the ability to harness emotions and apply them to tasks like thinking and problem solving; and the ability to manage emotions, which includes regulating your own emotions and cheering up or calming down other people."

Recently, many researchers investigated EI from different aspects such as the relationship between EI and academic achievement, team learning, evaluating managerial success, students' demographic characteristics and critical thinking tendency (Arıcıoğlu, 2002, Dutoğlu&Tuncel, 2008, Erdoğdu, 2008, Erdoğdu &Kenarlı, 2008, Günsel, Akgün & Keskin, 2010). Because of the interest toward it, the meaning of EI has become important. Cassady and Boseck (2008) emphasized that EI has a long history underlining that Thorndike, a famous American psychologist, was the first to use 'social intelligence' term that was combined with EI's definition in 1920. Salovey and Mayer (1990) described EI as a subset of social intelligence and stated that it "involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions" (p. 189).

Daniel Goleman's 1995 book named *Emotional Intelligence: Why It Can Matter More Than IQ* has significantly drawn attention when EI is concerned. In addition to Salovey and Mayer (1990), Goleman (1995) defined EI in his book as an intelligence which includes self-consciousness, effort, breaking the stimulations and the ability sharing others' emotions. Additionally, he emphasized that EI is more important than IQ since there is a probability about being unsuccessful with high IQ in daily life. According to Goleman (1998), the following factors are important for emotional intelligence: self-awareness, self-confidence, self-control, commitment, integrity, ability to communicate and influence, initiating, and accepting changes. Thus, it could be claimed that a person with high EI is aware of feelings, has the capability of overcoming the feelings, has personal motivation, empathizes with others and manages both his/her self's and others feelings.

Moreover, Abraham (2006) stated that EI level of graduate students is important for their career and success, and emphasized that educators have to consider students' needs and to integrate EI skills into educational programs. Additionally, he pointed that educators should attach significance to the graduates' technical and emotional training in order to raise qualified and equipped individuals business.

Brandenburg, et al. (2011) propose that engineering students should have advanced technical skills. However, only these skills will not be sufficient to be better in their field. From these perspectives, Zhou (2010) offer two possible reasons for the importance of EI in engineers' success First, "EI is significantly related to cognitive capability, with markedly strong effects on high scholastic achievement" (p.10). As cited in Riemer (2003), the second one is communication. Students' communication skills could be increased based on industry and improvement of EI elements Additionally, Riemer (2003) emphasized that engineering graduates with high EI will show better performance in their business life.

Erdoğdu (2008) conducted a study with the purpose of revealing the relationship between university students' the Emotional Quotient Scale points and certain socio-demographic features. The participants of the study were 532 students from Faculty of Science, Faculty of Engineering, School of Sport Sciences, School of Law, Faculty of Letters, Faculty of Fine Arts and Faculty of Dentistry. One of the research's findings showed that students attending Faculty of Fine Arts, and those attending School of Sport Sciences got the highest and lowest EI scores, respectively. '. Additionally, no significant difference was found among the students' EI scores regarding the faculties they were attending. Another study conducted by Behnke and Greenan (2011) investigated the relationship between postsecondary students' emotional-social intelligence and attitudes toward computer-based instructional materials and found a negative correlation. Brandenburg, et al. (2011) investigated emotional intelligence and academic performance of engineering students' and the difference in emotional intelligence of students in terms of demographic and experiential characteristics. The researchers recommended enhancement of engineering students' EI, and integrating EI besides leadership training into educational programs.

Thus, the purpose of the present study is to investigate EI levels of the engineering students studying at various universities in Turkey who participated in the TUBITAK Alternative Energy Car Races in 2011 in terms of several variables such as gender, age, having similar hobbies in daily life, having an engineer in family, and professional pessimism.

METHODOLOGY

In this study, EI levels of the Turkish engineering students from different universities who participated in the TUBITAK Alternative Energy Car Races were investigated. For this purpose, a descriptive model was utilized in the survey.
Survey models are research methods which aim to describe a past or existing case as it is. The important thing is to observe it properly and to determine (Karasar, 1994).
The relationship between EI and variables (having similar hobbies in daily life, having an engineer in family, state of professional pessimism) was evaluated. Additionally, t-test was used in order to determine whether there is a relationship between gender and EI levels of the students. One-way ANOVA was used to reveal whether there is a relationship between age and EI. Significance level was used as p=.05.

Participants

98 engineering students who participated in the TUBITAK Alternative Energy Car Races were selected as the participants of the study. Gender and age of the students were given in Table 1.

Table 1. Students' Demographic Features

		F	%
Gender	Female	22	22,4
	Male	76	77,6
Age	19-21	50	51,0
	22-24	42	42,9
	25-28	6	6,1

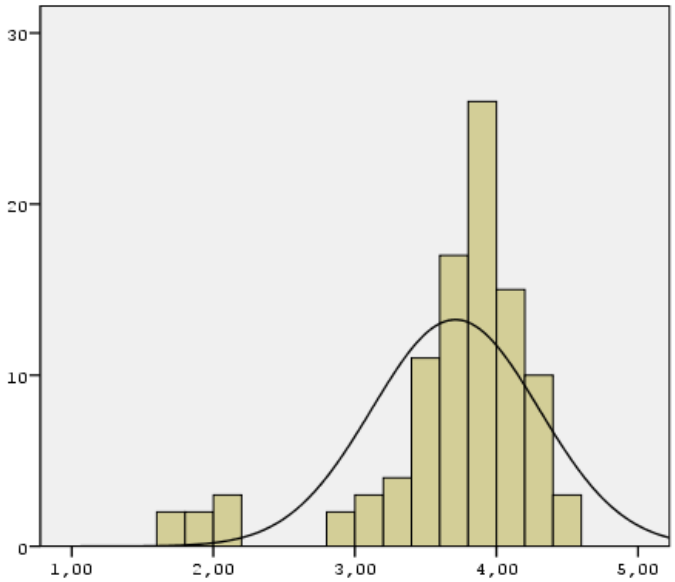
As seen in Table 1, 22.4 % of the students were female (N=22) and 77.6% were male (N=76). The majority of the students were in 19-24 age group (N=92).

Data Collection Tool

Students' EI levels were determined by "Emotional Intelligence Scale" (Schutte et al., 1998). Original scale's Cronbach's Alpha value was calculated between .87-.90. Cronbach's Alpha value was calculated as.93 for this study. Frequencies and percentages were used for expressing students' demographic features. The scale consists of two sections. In the first part, demographic features of the participants were determined. In the second part, a 5 Likert type scale was used to determine their EI scores. It has 30 positive and 3 negative items. high EI score was represented by high scores. The positive items were pointed from 1 (Totally disagree) to 5 (Totally agree). . Negative items were also pointed from 1 to 5 and reversely coded. In order to investigate the items based on students' opinions, mean score (emotional intelligence score) was detected based on the calculated values as below.
1.0 - 1.49 very low emotional intelligence score
1.50 - 2.49 low emotional intelligence score
2.50 - 3.49 average emotional intelligence score
3.50 - 4.49 high emotional intelligence score
4.50 - 5.00 very high emotional intelligence score
The following section offers findings and related discussion.

FINDINGS

Students' emotional intelligence scores were given in Graph 1.



Graph 1.
EI Scores Histogram Mean:3,71, Std.Dev.:0,59, N: 98

In Graph 1, students' EI score's mean was calculated as X=3,71 (N=98). To investigate the relationship between these scores and gender, the independent sample t-test was conducted. The results of t-test was given in Table 2.

Table 2
Independent Sample t-Test Results for gender variable

	C	N	$\bar{X}$	Ss	Levene Test F	Levene Test p	t	Df	p
Emotional intelligence	Female	22	3,7851	0,45583	1,722	0,193	0,676	96	0,500
	Male	76	3,6882	0,62472					

*p=0,05

According to Table 2, mean of female students' EI score was higher ($\bar{X}$=3,7851) than that of male students' ($\bar{X}$=3,6882). It could be claimed that female students' EI level was higher than male students'. Additionally, no relationship was found between gender and EI levels of the students (t=0,676; p>0,05).
One way-ANOVA was conducted to investigate the relationship between students' EI and age. The results were given in Table 3.

Table 3
One-way ANOVA result according to age

Age		Sum of Squares	Df	Mean of Squares	F	p
19-21 22-24 25-28	Between Groups	0,528	2	0,264	0,754	0,473
	Within Groups	33,266	95	0,350		

As shown in Table 3, there is no significant relationship between students' EI levels and age [F (2, 95) = 0,754; p > 0,05].
In the study, whether engineering students have similar hobbies regarding designing in their daily lives was investigated. The results were given in Table 4.

Table 4
The students having similar hobbies regarding developing design in their daily lives

	f	%
Yes	82	83,7
No	16	16,3

According to Table 4, 82% of the students have similar hobbies regarding designing. This finding can be related to getting engineering education.
In the study, whether students' having similar hobbies in their daily lives affect their EI was investigated. For this purpose, those who have similar hobbies regarding developing design in their daily lives and who don't have similar hobbies regarding developing design in their daily lives were compared in terms of their emotional intelligence scores. The results were given in Table 5.

Table 5
EI scores and having similar hobbies regarding developing design.

	N	X	SD
Students who have similar hobbies	82	3,7775	0,53329
Students who don't have similar hobbies	16	3,3636	0,75121
Total	98	3,7100	0,59025

Table 5indicates that the students who have similar hobbies regarding developing design have higher emotional intelligence score (X=3,7775) than those who don't (X=3,3636).
In the study, it was aimed to determine whether the students have an engineer in their family. The results were given in Table 6.

Table 6
Having an engineer in their own family

	N	%
Yes	33	33,7
No	65	66,3

As seen in Table 6, 33.7% of the students have an engineer in (N=33) in their family while 66.3% of them don't (N=65).
Subsequently, whether this significantly affects their EI was investigated. For this purpose, those who have an engineer in the family and who don't were compared in terms of their emotional intelligence scores. The results were given in Table 7.

Table 7
Comparison of EI scores of the students who have engineer in the family and who don't have.

	N	X	SD
Have	33	3,7603	0,51109
Don't have	65	3,6844	0,62885
Total	98	3,7100	0,59025

According to Table 7, the former had higher emotional intelligence score (X=3,7603, N=33) than the latter (X=3,6844, N=65).
In the study, it was aimed to reveal whether the students who participated in Alternative Energy Car Races have professional pessimism. The related test results were given in Table 8.

Table 8
Students' having professional pessimism

	N	%
No	63	64,3
Yes	35	35,7

According to Table 8, while 64.3 % of the students do not have professional pessimism (N=63), 35.7% of them do (N=35).

Whether students' having professional pessimism affects their emotional intelligence or not was investigated. For this purpose, students who have professional pessimism and who don't were compared in terms of their EI scores. The results were given in Table 9.

Table 9
Comparison of EI scores of the students who professional pessimism and who don't have.

	N	*X*	*SD*
Have profession pessimism	63	3,7566	0,56679
Don't have profession pessimism	35	3,6260	0,62996
Total	98	3,7100	0,59025

According to Table 9, the students who don't have professional pessimism had higher emotional intelligence score (X=3,7566, N=63) than those who have professional pessimism (X=3,6260, N=35).

DISCUSSION and CONCLUSION

The purpose of this study was to investigate EI levels of engineering students who are attending some activities which are related to their major profession. Findings of the study showed that there is no significant difference in the students' emotional intelligence scores in terms of age and gender. However, it was found that female students' EI scores were higher than the male students'. Zhou (2010) also concluded that female civil engineering students showed higher performance in overall EI performance than the male students. Similarly, BalcıÇelik and Deniz (2008) found that there is no significant difference in scouts' emotional intelligence scores in terms of gender. In contrast, Yılmaz (2007) and Erdoğdu (2008) concluded that there is a significant difference in terms of gender in favor of female students.

Additionally, the students who have similar hobbies regarding designing have higher EI scores than those who do not. Having similar hobbies regarding designing significantly affects their EI.

The students who have engineer in their family had higher EI scores than those who do not, which might be attributed to the fact that the former group is likely to take him/her as a role model.

And, the students who don't have professional pessimism had higher EI scores than those who do not. As in other professional fields, having positive views and feelings towards engineering might have affected the students' EI positively.

Consequently, it could be claimed that EI is an important concept in terms of engineering education since the students with higher EI have a hobby similar to engineering profession. Thus, these students attend to working groups as TUBITAK Formula-G Races. This participation provides engineering students to have experience of engineering profession, to see the applications of the field and to participate in R&D and P&D activities. Additionally, these kinds of organizations provide students to integrate STEM fields for their own project realizations and specified purposes. This integration would also be affected by students' EI levels. For this reason, not only engineering education but also all STEM fields should consider EI in all educational level. These organizations can motivate students to obtain engineering skills. To increase their EI levels, different activities should be organized. Engineering students' EI could also be investigated in terms of other variables in future studies no significant difference was found between the students' EI scores in terms of gender and age in the present study.

REFERENCES

Abraham, A. (2006). The need for the integration of emotional intelligence skills. *The Business Renaissance Quarterly, 1*(3), 65-79.

Arıcıoğlu, M. A. (2002). Yönetsel başarının değerlemesinde duygusal zekânın kullanımı: Öğrenci yurdu yöneticileri bağlamında bir araştırma. *Akdeniz İ.İ.B.F. Dergisi 4,* 26-42.

Balcı Çelik, S. &Deniz, M. E. (2008). A comparison of scouts' emotional intelligence levels with regards to age and gender variables: A cross-cultural study. *İlkogretim Online, 7*(2), 376-383.

Behnke, C., & J. P. Greenan (2011). The relationship between emotional intelligence and attitudes toward computer-based instruction of postsecondary hospitality students. *Journal of Career and Technical Education. 26*(1).

Brandenburg, S., Zhou, X., Bell, L., & Skipper, C. (2011). Emotional intelligence and academic performance of engineering students. *Engineering Project Organizations Conference*, Estes Park, Colorado, August 9-11.

Cassady, J. C., & Boseck, J. J. (2008). Educational psychology and emotional intelligence: Toward a functional model for emotional information processing in schools. In J. C. Cassady & M. A. Eissa (Eds.), *Emotional intelligence: Perspectives of educational and positive psychology*. New York, NY: Peter Lang Publishing.

Dutoğlu, G. &Tuncel, M. (2008). Aday öğretmenlerin eleştirel düşünme eğilimleri ile duygusal zekâ düzeyleri arasındaki ilişki. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 8*(1), 11-32.

Erdoğdu, M. Y. (2008). Duygusal zekânın bazı değişkenler açısından incelenmesi. *Elektronik Sosyal Bilimler Dergisi, 7*(23), 62-76.

Erdoğdu, M. Y. & Kenarlı, Ö. (2008). Duygusal zekâ ile akademik başarı arasındaki ilişki. *Milli Eğitim Üç Aylık Eğitim ve Sosyal Bilimler Dergisi, 178,* 297-310.

Goleman, D. (1995). *Emotional intelligence*. New York: Bantam Books.

Goleman, D. (1998). *Working with emotional intelligence*. New York: Bantam Books.

Günsel, A., Akgün, A. &Keskin, H. (2010). Duygusal zeka takım öğrenmesi ilişkisi: Yazılım geliştirme takımları üzerinde bir uygulama. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 24*(3), 117-138.

Karasar, N. (2008). *Bilimsel Araştırma Yöntemi* (18.Baskı). Ankara: Nobel Yayın Dağıtım

Psychology Today (2016). *What is Emotional Intelligence?* Retrieved (20/01/2017) from https://www.psychologytoday.com/basics/emotional-intelligence

Riemer, M. J. (2003). Integrating emotional intelligence into engineering education. *World Transactions on Engineering and Technology Education, 2*(2), 189-194.

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition, and Personality, 9*,185-211.

Scott, G., & Yates, K. W. (2002). Using successful graduates to improve the quality of undergraduate engineering programmes. *European Journal of Engineering Education, 27*(4), 363-378.

Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Cooper, J. T., Golden, C. J., & Dornheim, L. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences, 25*, 167–177.

Yılmaz, S. (2007). Duygusal zeka ve akademik başarı arasındaki ilişki. Unpublished master thesis, Atatürk University Graduate School of Social Sciences, Erzurum, Turkey.

Zhou, X. (2010). Assessment and analysis of emotional intelligence in engineering students. *Unpublished Master Thesis*, Graduate School of Clemson University, South Carolina.

TÜRKÇE GENİŞLETİLMİŞ ÖZET

Bu araştırmanın amacı, TUBITAK Alternatif Enerjili Araba Yarışları'na katılan ve Türkiye'nin farklı üniversitelerinin mühendislik fakültelerinde öğrenim görmekte olan öğrencilerin duygusal zeka düzeylerini cinsiyet, yaş, günlük hayatta tasarım geliştirmeyle benzer hobisi olma, ailesinde mühendis olma durumu ve mesleki kötümserlik gibi değişkenler açısından incelemektir. Bu amaçla yapılan çalışmada tarama modeli kullanılmıştır. Tarama modelleri geçmişte ve gelecekteki bir durumu olduğu gibi tanımlamayı amaçlar. Önemli olan onu uygun şekilde gözlemlemek ve belirlemektir (Karasar, 1994). Elde edilen veriler Schutte ve Ark.'ı (1998) tarafından geliştirilen "Duygusal Zeka Ölçeği" aracılığıyla mühendislik fakültelerinde eğitim gören 98 öğrenciden toplanmıştır. Duygusal zeka ve diğer değişkenler (cinsiyet, yaş, günlük hayatta tasarım geliştirmeyle benzer hobisi olma, ailede mühendis olması, mesleki kötümserlik durumu) arasındaki ilişki belirlenmeye çalışılmıştır. Cinsiyet ve duygusal zeka arasındaki ilişkiyi belirlemek için t-testi kullanılmıştır. Yaş ve duygusal zeka arasındaki ilişkiyi görmek için ise tek yönlü varyans analizi kullanılmıştır. Anlamlılık düzeyi p=.05 olarak belirlenmiştir. Çalışmaya katılan öğrencilerin %22.4 ü kız (N=22) ve %77.6 'sı ise erkek öğrencidir (N=76). Öğrencilerin büyük bir çoğunluğu 19-24 yaş aralığında (N=92) bulunmaktadır. Öğrencilerin duygusal zeka seviyeleri Shutte ve diğerleri (1998) tarafından geliştirilen "duygusal zeka ölçeği" ile belirlenmiştir. Orjinal ölçeğin Cronbach's Alpha değeri .87 ile .90 aralığında hesaplanmıştır. Bu çalışma için Cronbach's Alpha değeri .93 olarak hesaplamıştır. Öğrencilerin demografik özelliklerini vurgulamak amacıyla frekans ve yüzdelikler kullanılmıştır. Ölçek iki bölümden oluşmaktadır. Birinci kısımda katılımcıların demografik özellikleri belirlenmiştir. İkinci kısımda ise, öğrencilerin duygusal zeka puanlarını belirlemek için 5 li likert tipi ölçek kullanılmıştır. Ölçekte 30 pozitif ve 3 negatif madde bulunmaktadır. Yüksek duygusal zeka puanı yüksek puanla gösterilmiştir. Pozitif maddeler 1 (Tamamamen katılmıyorum)'den 5 'e (Tamamen katılıyorum) puanlanmıştır. Negatif maddeler de aynı şekilde 1'den 5'e fakat ters şekilde kodlanmıştır. Öğrencilerin puanlarını yorumlayabilmek için ortalama duygusal zeka puanı hesaplanmıştır. 1.00 ve 1.49 arası çok düşük, 1.50 ve 2.49 arası düşük, 2.50 ve 3.49 arası ortalama, 3.50 ve 4.49 arası yüksek, 4.50 ve 5.00 arası ise çok yüksek duygusal zeka olarak yorumlanmıştır. Bulgular öğrencilerin duygusal zeka puanlarında yaş ve cinsiyet açısından önemli bir farklılık olmadığını göstermiştir. Ayrıca tasarım geliştirmeye yönelik benzer hobisi olan, ailesinde mühendis olan, ve mesleki kötümserlik sahibi olmayan öğrencilerin duygusal zeka puanlarının diğerlerine göre daha yüksek olduğu ortaya çıkmıştır. Sonuç olarak, duygual zekanın mühendislik eğitimi açısından önemli bir olgu olduğu savunulabilir. Çünkü yüksek duygusal zekaya sahip öğrenciler mühendislik mesleğine benzeyen bir hobiye sahip olmaktadır. Bu yüzden bu öğrenciler TUBITAK Formula-G yarışları gibi organizasyonlara katılmaktadırlar. Bu organizasyonlara katılmak, mühendislik öğrencilerinin mühendislik mesleği ile ilgili tecrübe kazanmasına, alanlarının uygulamalarını görmelerine ve ARGE ve ÜRGE aktivitelerine katılmalarını sağlamaktadır. Ek olarak bu tür organizasyonlar öğrencilerin özel amaçlarına ulaşmaya yönelik proje uygulamalarında FeTeMM alanlarının ilişkilendirilmesine ortam sağlar. FeTeMM ilişkilendirmesi öğrencilerin duygusal zeka seviyelerinden de etkilenecektir. Eğitimin her düzeyinde duygusal zeka sadece mühendislik eğitiminde değil aynı zamanda tüm FeTeMM disiplinlerinde göz önüne alınması gereken bir kavramdır. Bu tür organizsayonlar, öğrencilerin mühendislik becerilerini elde etmeleri için motive edici olabilir.Öğrencilerin duygusal zeka seviyelerini artırmak için farklı aktiviteler organize edilmelidir. Bu çalışmada öğrencilerin duygusal zekalarının cinsiyet ve yaş açısından bir farklılığa rastlanmadığı için, mühendislik öğrencilerinin duygusal zekaları başka çalışmalarda farklı değişkenler açısından incelenebilir.