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Applying Bootstrap Resampling to Compute Confidence Intervals for Various Statistics with R

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ABSTRACT

Background: Most of the studies in academic journals use p values to represent statistical significance. However, this is not a good indicator of practical significance. Although confidence intervals provide information about the precision of point estimation, they are, unfortunately, rarely used. The infrequent use of confidence intervals might be due to estimation difficulties for some statistics. The bootstrap method enables researchers to calculate confidence intervals for any statistics. Bootstrap resampling is an effective method of computing confidence intervals for nearly any estimate, but it is not very commonly used. This may be because this method is not well known or people may think that it is complex to calculate. On the other hand, researchers may not be familiar with R and be unable to write proper codes.

Purpose: The purpose of this study is to present the steps in the bootstrap resampling method to calculate confidence intervals using R. It is aimed toward guiding graduate students and researchers who wish to implement this method. Computations of bootstrapped confidence interval for mean, median and Cronbach's alpha coefficients were explained with the R syntax step-by-step. Moreover, traditional and bootstrapped confidence intervals and bootstrapped methods were compared in order to guide researchers. **Main Argument and Conclusions:** With the help of statistical software today it is easy to compute confidence intervals for almost any statistics of interest. In this study R syntax were used as an example so that beginners can use R to compute confidence intervals. Results showed that traditional and bootstrapped confidence intervals have very similar results for normally distributed data sets. Moreover different bootstrapped methods produce different results with skewed data sets. This is because bias corrected and accelerated interval methods are suggested for use with skewed data sets. **Implications for Research and Practice:** R codes presented in this study guide researchers and graduate students while computing bootstrap confidence intervals. Furthermore findings about the comparison of bootstrap methods help researchers choose the most appropriate bootstrap methods. Results and the main argument of this study may encourage researchers to compute bootstrap confidence intervals in their studies.

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Introduction

The p value is the probability under the assumption that there is no true effect or no true difference of collecting data that shows a difference equal to or more extreme than what it is actually observed (Reinhart, 2015). Hypothesis testing uses p value to get statistical significance. It is the most widely reported statistic in academic journals. M. Marshall et al. (2000) highlighted that significance of testing is reported in 97% of the research papers in experimental psychology research journals. However the p value has some limitations and it is not an indicator of practical significance. It is well known that confidence intervals provide more information than p values (Haukas & Lewis, 2005). Effect sizes, confidence intervals, and confidence intervals of effect sizes are indicators of practical significance (Banjanovic & Osborne, 2015). Editors of many scientific journals require the use of confidence intervals (Cooper, Wears & Schriger, 2003). Moreover APA's Publication Manual (2001) highlighted the importance of calculating and reporting confidence intervals and effect sizes in academic research.

Unfortunately confidence intervals are rarely reported in academic papers. Reinhart (2015) stated the reasons for this as follows:

It's best to do statistics the same way everyone else does, or else the reviewers might reject your paper. Or maybe the widespread confusion about p values obscures the benefits of confidence intervals. Or the overemphasis on hypothesis testing in statistics courses means most scientists don't know how to calculate and use confidence intervals.

According to Banjanovic and Osborne (2015) the infrequent use of confidence intervals is due to estimation difficulties for some statistics. Some statistics may require multi-step formulas with assumptions that might not always be viable for calculating confidence intervals.

The bootstrap method enables researchers to calculate confidence intervals for any statistics regardless of the data's underlying distribution. The empirical bootstrap was introduced in 1979 (Efron 1988), but it was feasible to implement it without modern computing power. However, computers and statistical software have improved a lot, and today it is possible to calculate confidence intervals using the bootstrap method. Moreover free and open source R software enables researchers to write their own syntax to calculate confidence intervals for various statistics.

Bootstrapping

Briefly, bootstrap methods are resampling techniques for assessing uncertainty. In a broad sense the bootstrap is a widely applicable and extremely powerful statistical tool that can be used to quantify the uncertainty associated with a given estimator or statistical learning method (James et al., 2014). Bootstrap resampling is a method of computing confidence intervals for nearly any estimate. In most studies

the researchers begin with the population and take a sample from the population and run an analysis on that sample. In bootstrap resampling additional sub-samplings and replications are implemented on the original sample. In other words in the beginning of the process thousands of “bootstrapped resamples” are generated from the original sampling using random sampling with replacements. Then the designated statistic (mean, median, regression, Cronbach’s alpha coefficient, etc.) is replicated in each of these resamples. Therefore, researchers may get thousands of estimates on the designated statistics. Distribution of those estimates is called “bootstrap distributions”. The bootstrap distribution may be used to estimate more robust empirical confidence intervals. In bootstrap sampling the number of replications is very important. Diccio and Efron (1996) highlight the importance of using at least 2000 replications while conducting bootstrap resampling. A schematic description of the steps for estimating confidence intervals using bootstrap formed by Haukoos & Lewis (2005) is shown in Figure 1.

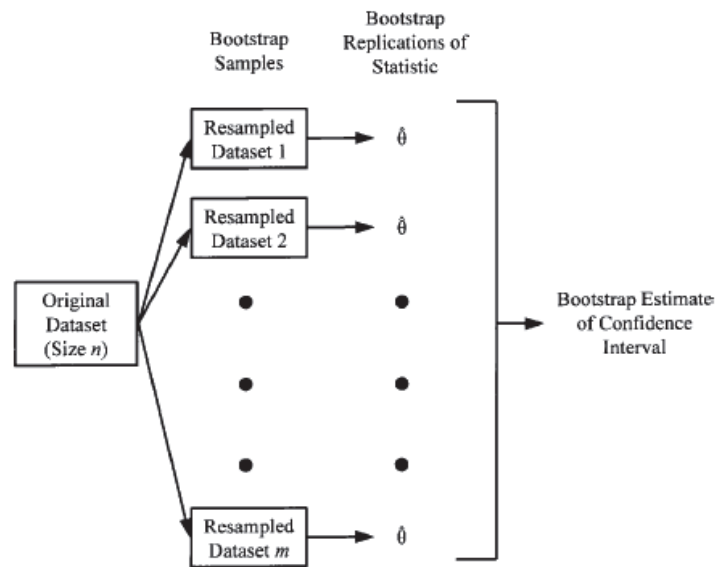


Figure 1: Description of the steps in bootstrapping.

Methods of Bootstrapping

There are different methods for estimating confidence intervals from a bootstrapped distribution. The most frequently used methods are:

- The normal interval method

- The percentile interval method
- The basic interval method
- The bias corrected and accelerated interval method.

The normal interval method computes an approximate standard error using bootstrap distribution (sampling distributions resulting from bootstrap resamples). Then Z distribution is used to get the confidence interval. The percentile interval method uses a frequency histogram of the specific statistics computed from bootstrap samplings. The 2.5 and 97.5 percentiles constitute the limits of 95% confidence intervals (Haukoos & Lewis, 2005). The percentile interval method makes no adjustment while the student interval method corrects each statistic by its associated standard error and converts the distribution to studentized distribution. Then the confidence intervals are found at the 0.025 and 0.975 quantiles as done in the percentile interval method. The bias corrected and accelerated interval method corrects the distribution for bias and acceleration. This method adjusts the distribution based on two coefficient called "bias correction" and "acceleration". The bias correction adjusts for the skewness in bootstrap distribution; it will be zero when bootstrap sampling is perfectly symmetric. On the other hand, coefficients of acceleration do corrections for non-constant variances within the resampled data set (Efron, 1988). Then confidence intervals are found at the 0.025 and 0.975 quantiles of the corrected distribution. The basic interval method corrects the distribution for bias and detects the lower and upper bounds which cover the desired confidence interval (Banjanovic & Osborne, 2015). Each bootstrapping method has advantages and disadvantages, and it is important to use the more appropriate method when computing confidence intervals for the statistic of interest.

Unfortunately, it is not very common to use the bootstrap method to calculate confidence intervals. This may be because they are not well known or people may think that it is complex to calculate. There is statistical software that enables users to compute confidence intervals using bootstrap methods. R is one such software. It is a language and environment for statistical computing and graphics. Because it is free and open-sourced, R has become popular recently for statistical data analysis. Moreover R syntax may seem complicated for people and this may dissuade them from use bootstrapping methods to calculate confidence intervals. Furthermore, comparisons of bootstrapping methods may guide researchers while deciding the methods to be used.

The purpose of this study is to present the steps in the bootstrap resampling method to calculate confidence intervals using R syntax. It is aimed to guide graduate students and researchers who wish to implement bootstrap resampling using R programming language. Computation of bootstrapped confidence intervals for mean, median and Cronbach's alpha coefficient were explained step-by-step using the R syntax. Moreover, some comparisons have been made. Traditional and bootstrapped confidence intervals were compared while computing mean for normally distributed data and median for normally distributed and skewed data sets.

In this study R codes were written on R consoles and directly copied and pasted on this manuscript. This is why R codes have different letter characters and sizes from the other texts in the paper; so many R codes were presented in the paper, they were not defined as figures.

Traditional Confidence Interval for Mean

Traditionally confidence intervals are computed using the formula $\bar{x} \pm 1.96 * \left(\frac{s}{\sqrt{n}}\right)$ where \bar{x} is the mean and s is the standard deviation and n is the sample size. In this part at first a pedagogical example is presented to compare traditional confidence intervals and bootstrap confidence intervals. We will first generate random data with 100,000 observations. This data set is viewed as population. The population has random normal distribution (Mu=60, Sigma=7) with 100,000 observations.

```
> population<-rnorm(100000,60,7)
> str(population)
 num [1:100000] 64.5 65.2 51.9 61.5 50.5 ...
```

Next we take six random samples of 50 observations from the population in order to compute traditional confidence intervals.

```
> list<-vector("list",6)
> for ( i in 1:6) {list[[i]]<-sample(population,50)}
> str(list)
List of 6
 $ : num [1:50] 51.3 63.5 74.7 60.5 62.8 ...
 $ : num [1:50] 57.5 48.7 70.2 74.8 57 ...
 $ : num [1:50] 52.9 50.3 63.2 56.7 62.3 ...
 $ : num [1:50] 57 55.3 62.7 69.4 62 ...
 $ : num [1:50] 59.5 56.6 59.1 55.6 58.7 ...
 $ : num [1:50] 59.9 54.4 52.8 57.5 52.5 ...
```

The next step is to write a simple function to calculate confidence intervals for the six samples taken randomly from the population.

```
> conf.interval<-function(x){ mean=mean(x); sd<-sd(x); n<-length(x)
+ se<-1.96*(sd/(n**.5)); ci<-c(mean=mean,lowerci=mean-se,upperci=mean+se)
+ return(ci)}
> conf.interval(list[[1]])
 mean lowerci upperci
59.85779 57.66439 62.05119
```

Now it is easy to compute 95% confidence intervals for the samples randomly taken from the population. We can round the results to two digits using the round () function.

```
> round(conf.interval(list[[1]]),2)
  mean lowerci upperci
59.86  57.66  62.05
```

We can also write another function to take six random samples from the population. It would be better to define `set.seed()` for each sample. We will use the same samples to generate six different bootstrap distributions so we can compare confidence intervals.

```
> conf.intervall1
function(x,seed) { set.seed(seed)
  sample<-sample(x,50); mean<-mean(sample);sd<-sd(sample)
  n<-length(sample); se<-1.96*(sd/(n**.5))
  ci<-round(c(mean=mean,lowerci=mean-se,upperci=mean+se),2)
  return(ci)}

conf.intervall1(population,seed=10)
  mean lowerci upperci
61.33  59.76  62.90
conf.intervall1(population,seed=20)
  mean lowerci upperci
60.46  58.27  62.65
conf.intervall1(population,seed=30)
  mean lowerci upperci
59.73  57.55  61.91
conf.intervall1(population,seed=40)
  mean lowerci upperci
59.21  57.33  61.09
conf.intervall1(population,seed=50)
  mean lowerci upperci
61.71  59.53  63.89
conf.intervall1(population,seed=60)
  mean lowerci upperci
61.24  59.03  63.45
```

Now we can compute 95% confidence intervals of six samples randomly taken from the population. We defined `set.seeds` as 10, 20, 30, 40, 50 and 60 for 6 samples respectively.

Bootstrapped Confidence Interval for Mean

In order to get bootstrap distribution, the “boot” package will be used (Canty & Ripley 2016). The “boot” function is used to generate bootstrap distribution for specific samples, but this function requires writing simple functions about the statistics of interest.

```
> select
function(x,seed) { set.seed(seed)
sample<-sample(x,50)
return(sample)}
> mean.func
function(x,i){ mean(x[i]) }
```

The first function is used for the first argument of “boot” function. It is used to take the specific sample from the population. The second one is the statistics of interest that is “mean” in this example.

```
> boot.sample1<-boot(select(population,seed=10),mean.func,R=2000)
> boot.sample2<-boot(select(population,seed=20),mean.func,R=2000)
> boot.sample3<-boot(select(population,seed=30),mean.func,R=2000)
> boot.sample4<-boot(select(population,seed=40),mean.func,R=2000)
> boot.sample5<-boot(select(population,seed=50),mean.func,R=2000)
> boot.sample6<-boot(select(population,seed=60),mean.func,R=2000)
```

So we generated six bootstrap distributions with 2,000 resamples. We used the “select” and “mean.func” functions within the “boot” functions. Below is the bootstrap statistics for the first sample.

```
Bootstrap Statistics :
      original      bias  std. error
t1*  61.33011 -0.02389115  0.8002305
```

The value original is the mean of the whole sample while bias is the difference between the original mean and the mean of the bootstrapped samples. Standard error is the standard deviation of the simulated values. The next step is calculating confidence intervals for each original and bootstrapped samples. We used the “boot.ci” function to compute confidence intervals for each bootstrapped sample.

```
> ci.boot1<-boot.ci(boot.sample1) > ci.boot2<-boot.ci(boot.sample2)
> ci.boot3<-boot.ci(boot.sample3) > ci.boot4<-boot.ci(boot.sample4)
> ci.boot5<-boot.ci(boot.sample5) > ci.boot6<-boot.ci(boot.sample6)
```

```
Intervals :
Level      Normal          Basic
95%    (59.79, 62.92 )    (59.75, 62.94 )

Level      Percentile      BCa
95%    (59.72, 62.91 )    (59.79, 62.96 )
Calculations and Intervals on Original Scale
```

The “basic” title in the R output refers to “basic interval method”. In this method confidence intervals are estimated by correcting the bootstrap distribution for bias or skew. The “Bca” title in R output refers to the “bias corrected and accelerated interval method”. In the Bca method the bootstrap distribution is corrected for bias and

acceleration and the CI are found at the .025 and .975 quantiles of the corrected distribution (Carpenter & Bithell 2000; Banjanovic & Osborne, 2015).

Comparison of Traditional and Bootstrapped Confidence Intervals for Mean

The result of the “boot.ci” function produces confidence intervals for four main bootstrapped methods discussed earlier. Table 1 presents the comparison of confidence intervals of each original random sample and its associated bootstrap distributions.

Table 1

Confidence Intervals for Original and Bootstrapped Samples

Sample	Mean	Traditional 95% CI		Bootstrapped 95% CI	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound
1	61.33	59.76	62.90	59.79	62.92
2	60.46	58.27	62.65	58.34	62.59
3	59.73	57.55	61.91	57.54	61.94
4	59.21	57.33	61.09	57.32	61.08
5	61.71	59.63	63.89	59.53	63.88
6	61.24	59.03	63.45	58.97	63.46

As seen in Table 1 two methods produce very similar results. The differences are at the first or second decimal place. However, it is very important to note that those methods will yield very similar results unless the data violates parametric assumptions such as normality (Banjanovic & Osborne, 2015).

Bootstrapped Confidence Intervals for Median

Median is the observation at the 50th percentile in a set of data ordered from the lowest value to the highest value. It is commonly reported and considered a more valid definition of center when the frequency distribution of the variable is skewed. No simple formula exists for computing confidence intervals for median. According to central limit theorem, the number of resampled data sets increasing the distribution of the resulting statistic will become approximately normal (Zar, 1999). However, using the bootstrapped resampling method, it is possible to calculate the confidence interval for median.

In this example we will calculate the confidence interval for median using two different data sets; one is normally distributed and the other is skewed. Next we will compare bootstrapped methods with each other.

We had a normally distributed data set with 1,000,000 observations called “population”. Now we generate another data set called “population 2” with

1,000,000 observations using skewed chi-square distribution. In the previous example the population had 100,000 observations. There is no technical reason for increasing the number of the observations from 100,000 to 1,000,000. Both are large enough. It is aimed to demonstrate to the reader how R could easily generate big data sets.

```
> population2<-rchisq(1000000,5)
> str(population2)
 num [1:1000000] 1.82 2.05 2.62 3.71 3.22 ...
> |
```

First we will compute a confidence interval for median using a normally distributed population. We compute bootstrapped distributions and bootstrapped confidence intervals using the functions below, previously mentioned in detail. Additionally we added a new simple function called "median.func" to calculate the median within the "boot" function.

```
> median.func
function(x,i) { median(x[i]) }

> norm.sample<-boot(select(population,seed=15),median.func,R=2000)
> norm.sample

> boot.ci(norm.sample)
```

Then we will compute bootstrapped confidence intervals for the median using skewed distributed population.

```
> skew.sample<-boot(select(population2,seed=15),median.func,R=2000)
> boot.ci(skew.sample)
```

Comparison of Bootstrapping Methods Regarding Distributions of Data Sets

Table 2 summarizes the confidence intervals for normally distributed and skewed data sets regarding bootstrapping methods.

Table 2

Comparison Confidence Intervals Regarding Bootstrapping Methods

Methods for Bootstrapping	Normally Distributed Data		Skewed Data	
	95% Confidence Interval		95% Confidence Interval	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
The normal interval method	56.80	59.04	4.133	6.071
The percentile interval method	56.87	59.35	4.081	5.865
The basic interval method	56.66	59.14	4.295	6.078
Bias corrected and accelerated interval method	56.86	59.32	3.740	5.848

Table 2 shows that all bootstrapping methods for normally distributed data sets produce very similar confidence intervals. The only differences are at the first or second decimal place. On the other hand, for skewed data sets bootstrapping methods produce different confidence intervals. Therefore, different methods of skewed data sets of bootstrapping may produce different results. Before deciding the bootstrapping method to be used, their assumptions should be taken into consideration. The bias corrected and accelerated interval method requires no assumptions about the distribution of the data sets while others do. So it is better to consider using this method to compute confidence intervals with skewed data set.

Bootstrapped Confidence Intervals for Cronbach's Alpha Coefficient

Cronbach's alpha coefficient is an indicator of reliability that is commonly used, especially in psychological tests. In fact, it is the indicator of internal consistency. Many researchers use Cronbach's alpha coefficient for a set of items to construct a scale. Coefficient alpha (commonly called Cronbach's alpha) was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale; it is expressed as a number between 0 and 1. Calculating alpha has become common practice because it is easier to use than other estimates (e.g. test retest reliability estimates) as it only requires one test administration (Tavakol & Dennick, 2011). Item-total correlations are the correlation between an item and all other items, where the total of the other items is achieved by summing and averaging them (Banjanovic & Osborne, 2015). Moreover computing confidence intervals for Cronbach's alpha coefficient and item total correlations provides a very good indication of the generalizability of the results.

To compute traditional item total correlations and Cronbach's alpha coefficient the "CTT" package was used (Willse, 2014). In order to compute bootstrapped confidence intervals for Cronbach's alpha coefficient and item-total correlations, "boot" package has been used. The data is taken from a five-item scale that was administered to 300 hundred participants.

First the item total correlations and Cronbach's alpha coefficient were computed with the codes given below. "cr.data1" is the original data set. The object "cr.alp" was created to compute the statistics of interest. "cr.alp\$alpha" is the Cronbach's alpha coefficient and "cr.alp\$pBis" is the item total correlations for each of the five items.

```
> cr.alp<-reliability(cr.data1,itemal=TRUE)
> cr.alp$alpha
[1] 0.8346358
> cr.alp$pBis
[1] 0.5964466 0.7006749 0.6642530 0.6159572 0.6021944
```

Before bootstrapping 2,000 resamples we were required to write a simple function to use within the boot function. "cr.samp1" is the function that might be used to compute Cronbach's alpha coefficients and item total correlations for bootstrapped resamples.

```
> cr.samp1
function(data, indices) {
  sample<-data[indices,]
  cr.alpha<-reliability(sample, itemal = TRUE)
  result=with(cr.alpha,c(alpha,pBis))
  return(result)}

```

Next 2,000 bootstrapped resamples were generated using the boot function given below. This process may take 30 minutes to 1 hour depending on the size of the original sample and the number of the bootstrapped samples. The values named as original in the output are the Cronbach's alpha coefficient (the first row) and item total correlations (rows 2 to 5) for the original data set. Bias is the difference between the original and the bootstrapped values. Standard error is the standard deviation of the simulated values.

```
> cronbach <- boot(data=cr.data1, statistic=cr.samp1, R=2000)
```

```

Bootstrap Statistics :
      original      bias  std. error
t1* 0.8346358 -0.0014286370 0.02290934
t2* 0.5964466  0.0017199229 0.05168665
t3* 0.7006749 -0.0001259864 0.03830456
t4* 0.6642530 -0.0016074008 0.04738270
t5* 0.6159572 -0.0007566143 0.05757076
t6* 0.6021944  0.0001811386 0.05587665

```

The next task is to compute confidence intervals for Cronbach's alpha coefficient and item total correlations. The function "boot.ci" was used to calculate those intervals, but we needed to write another function including the "boot.ci" function. This function is called "computeCI" When writing the code, I was inspired from the code written by Banjanovic and Osborne (2015). The first line in the output gives confidence intervals for Cronbach's alpha coefficient and the rest of the lines give the intervals for item total correlations for each item respectively. I restricted the output only with the "percentile" method of bootstrapping discussed above.

```

> computeCI<-function(alpha){
+ Conf.Interval<-do.call("rbind", sapply(1:6, FUN = function(i)
+ boot.ci(alpha,type="perc", index=i)$perc[4:5], simplify = FALSE))
+ return(Conf.Interval)}
> computeCI(cronbach)
      [,1]      [,2]
[1,] 0.7851932 0.8749758
[2,] 0.4932083 0.7001377
[3,] 0.6206685 0.7704308
[4,] 0.5632592 0.7518773
[5,] 0.4953220 0.7198234
[6,] 0.4808203 0.7054129

```

Table 3 presents the values and confidence intervals for the statistics of interest.

Table 3

Item Total Correlations, Cronbach's Alpha Coefficient, and Related Confidence Intervals

Items	Original Item Total Correlation	Bootstrapped confidence Intervals	
		Lower CI	Upper CI
1	0.60	0.49	0.70
2	0.70	0.62	0.77
3	0.66	0.56	0.75
4	0.62	0.49	0.71
5	0.60	0.48	0.71
Cronbach Alpha	0.83	0.79	0.87

As seen in Table 3, Cronbach's alpha coefficient for the scale is 0.83 and the item total correlations vary between 0.60 and 0.70. The confidence intervals for Cronbach's alpha is relatively small compared to those for item total correlations (0.79 - 0.87). On the other hand, confidence intervals for item total correlations are wide. This may lead us to expect that there will be significant variability in the point to estimate for item total correlations in other similar samples. The purpose of this study is not to construct or adopt a scale, so the results are not discussed in detail. But the point is that computing confidence intervals for Cronbach's alpha coefficient and item total correlations may guide the researcher while constructing scales.

Discussion

Confidence intervals are good indicators of practical significance, unlike p values and they also provide more information than p values (Haukas & Lewis, 2005). Unfortunately, confidence intervals are rarely reported in academic papers. This is because computing confidence intervals are not practical and not possible for some statistics. This is why bootstraps methods, which are resampling techniques for assessing uncertainty, have become popular.

In this study the basic principles of bootstrapping and some commonly used bootstrapping methods were briefly presented. Then computation of bootstrapping methods for mean, median and Cronbach's alpha coefficient were explained using R syntax. Furthermore, some comparisons were done. Traditional and bootstrapped confidence intervals were compared for mean. Moreover bootstrapped methods were compared while calculating median for normally distributed and skewed data sets.

With the help of statistical software today it is easy to compute confidence intervals for almost any statistics of interest. R, which is a free and open-sourced software, is one of them. This is why in this study R syntax was used as an example so that beginners could use the R software to compute confidence intervals. Those syntax are not the only solutions but they are just some of the many other possible ways to write syntax while computing confidence intervals.

The results of the comparisons done in this study show that with normally distributed data, traditional and bootstrapped confidence intervals are close to each other. However, with skewed data sets this may not be so. In these cases the bootstrapped methods come into prominence.

The other important point is deciding the bootstrapped methods to be used when computing confidence intervals. Banjanovic and Osborne (2015) present very effective strategy to decide the bootstrapped methods to be used. They suggest that researchers answer four simple questions.

1. Is there a formula to estimate the standard error of the statistics?
2. Is the distribution symmetrical around the mean of the bootstrapped distribution?
3. Is the distribution normal?
4. Is the sample estimate a biased estimate of the population statistics?

The answer for the first question is “yes” for mean but “no” for median. For example, for small samples or skewed distributions it may be advised to run different methods. If the results differ from each other it may be advised to use the bias corrected and accelerated interval method since it has no assumptions about the distributions while the others do. Therefore, for the example presented in Table 2 it would be better to use the bias corrected and accelerated interval method. However, Banjanovic and Osborne (2015) highlighted that bootstrap analysis may not repair highly biased samples. This principle should be kept in mind. For in-depth information about the assumptions of bootstrapped methods, see Davison & Hinkley (1997), Carpenter & Bithell (2000) and Chernick & Labudde (2011).

Using bootstrapped analysis is also very effective for statistics that already have a formula to calculate standard error. Although it is possible to compute standard errors for intercept and slope of the regression line in linear regression analysis, bootstrapped analysis may produce more accurate standard errors (James et al. 2014).

In this study computing bootstrapped methods for mean, median and Cronbach’s alpha coefficient were illustrated because they are commonly used in social sciences. But it is also possible to compute bootstrapped confidence intervals for almost any statistics of interest such as effect size, linear regression, logistic regression, factor analysis, etc. Each of them may be calculated using “boot” packages illustrated in this paper. But this package requires writing a simple chunk of code about the statistic of interest, which can be used within the “boot” function.

Briefly, with help of statistical software like R it is possible to conduct bootstrapped analysis. Researchers are now able to compute confidence intervals for almost any statistics. Unfortunately, reporting bootstrapped confidence intervals in academic journals is very rare. In this study basic steps for calculating bootstrapped confidence intervals for some commonly used statistics were illustrated using R syntax. Therefore, it is expected that this study guide will enable researchers to compute bootstrapped confidence intervals and lead them to report confidence intervals in their academic studies.

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Bootstrap Örnekleme Yönteminin Çeşitli İstatistikler için Güven Aralığının Hesaplanmasında R Yazılımı ile Kullanımı

Atıf

Dogan, D. (2017). Applying bootstrap resampling to compute confidence intervals for various statistics with R. *Eurasian Journal of Educational Research*, 68, 1-17, <http://dx.doi.org/10.14689/ejer.2017.68.1>

Çalışmanın Temeli: Yokluk hipotezine dayalı istatistiksel testler istatistiksel manidarlığı belirlemek için p değerini kullanır. Akademik dergilerde en çok rapor edilen istatistik olan p değeri pratik manidarlık anlamında önemli sınırlılıklara sahiptir. Güven aralığının p değerine kıyasla daha fazla bilgi sağladığı belirtilebilir. Etki büyüklüğü, güven aralığı ve etki büyüklüğüne ilişkin güven aralığı pratik manidarlığın göstergeleri olarak görülür. Pek çok akademik dergi editörü güven aralığı hesaplarının makalelerde rapor edilmesi gerektiğini vurgulamaktadır. Aynı şekilde APA 2001 raporunda güven aralığı ve etki büyüklüğünün raporlanmasının önemi vurgulanmıştır. Ancak tüm bunlara rağmen akademik makalelerde güven aralığının raporlanma oranı çok düşüktür. Bunun bir nedeni araştırmacıların çok yaygın rapor edilen p değerinden daha farklı bir istatistiği rapor etme konusundaki çekinceleri olabilir. Bu durum araştırmacıların hatalı da olsa grubun büyük çoğunluğuna uyum sağlama davranışı sergilemelerine ve bu sayede makalenin kabul edilme olasılığına artırmak istemelerine dayalı olabilir. Bir diğer neden ise bazı istatistikler için güven aralığının hesaplanmasının pratik veya mümkün olmamasıdır. Bootstrap örnekleme yöntemi güven aralığı hesaplama sürecinde kullanılacak güçlü bir istatistiksel yaklaşımdır. Temel amaç evrenden seçilen bir örneklem üzerinden yerine koyarak örnekleme yöntemi ile yeni örneklem oluşturmaya dayanır. Elde edilen yeni örneklemle ilişkin istatistikler hesaplanarak standart hata ve güven aralığı kestirimi yapılabilir. Bu sayede geleneksel olarak standart hata ve güven aralığı tahmini yapılamayan pek çok istatistik için güven aralığının hesaplanmasına olanak tanır. Yerine koyarak örnekleme yöntemi kullanıldığı için orijinal örneklemden daha fazla gözlem sayısını içeren örneklem oluşturulabilir. Temelleri 1979 yılında atılan bootstrap analizinin kullanımı bilgisayar yazılımlarının gelişimi ile yaygınlık kazanmıştır. Yazılımların da yardımı ile pratik bir şekilde hesaplanabilecek bu yöntem maalesef çok nadir kullanılmakta ve araştırma makalelerinde rapor edilmemektedir. Bu durumun temel nedeni bootstrap yönteminin ve bu süreçte R yazılımının nasıl kullanılacağına yeteri kadar bilinmemesi yatabilir. Alan yazına bakıldığında bootstrap yönteminin R kodları ile açıklandığı çalışmaların sınırlı olduğu belirlenmiştir.

Çalışmanın Amacı: Bu çalışmada bootstrap örnekleme yöntemine dayalı olarak yaygın kullanılan bazı istatistikler için güven aralığı hesaplama sürecinin R kodları ile açıklanması amaçlanmıştır. Çalışmada öncelikli olarak bootstrap örnekleme yöntemine ilişkin kuramsal bilgiler verilmiş ve kullanılacak farklı bootstrap

yöntemlerine ilişkin açıklamalar yapılmıştır. Akabinde sosyal bilimlerde yaygın olarak kullanılan aritmetik ortalama, ortanca ve Cronbach Alfa içtutarlık katsayısına ilişkin bootstrap güven aralığı hesaplama süreci örneklendirilmiştir. İlk olarak R kodları kullanılarak aritmetik ortalama için geleneksel güven aralıkları ve “boot” paketinden faydalanarak bootstrap güven aralıkları hesaplanmış ve sonuçlar karşılaştırılmıştır. Daha sonra normal ve çarpık olan iki dağılım üzerinden ortanca için bootstrap güven aralıkları hesaplanmış ve farklı bootstrap yöntemleri bu bağlamda karşılaştırılmıştır. Son olarak Cronbach Alfa içtutarlık katsayısına ilişkin bootstrap güven aralıkları hesaplanmış ve örneklendirilmiştir.

Kaynak Kanıtları: Çalışma sürecinde geleneksel güven aralığı hesaplama sürecine ilişkin R kodları sunulmuştur. Ayrıca “boot” paketinden faydalanılmış ve bu paket içerisinde yer alan “boot” ve “boot.ci” fonksiyonları açıklanmıştır. Bu paket içerisinde yer alan “boot” ve “boot.ci” fonksiyonları güven aralığı için hesaplanacak her istatistik için yeni kodların yazımını gerektirmektedir. Bu kodlar da araştırma içerisinde sunulmuş ve nasıl kullanılacağına yönelik açıklamalarda bulunulmuştur. Çalışmanın özet bölümünün sayfa sınırlılığı nedeni ile orijinal İngilizce metninde sunulan R kodları ve fonksiyonlar burada verilmemiştir. Ancak tartışma ve sonuçlar bölümünde öne çıkan bulgular ve ilgili yöntemin kullanımına ilişkin önemli açıklamalar sunulmuştur.

Tartışma ve Sonuçlar: Bootstrap örnekleme yöntemi uygulama ve yorumlama açısından oldukça pratiktir. R programlama diline ilişkin temel düzeyde bilgiler ile bootstrap örnekleme yöntemi kolaylıkla gerçekleştirilebilir. Çalışma kapsamında gerçekleştirilen karşılaştırmada aritmetik ortalama için geleneksel ve bootstrap yöntemi ile kestirilen güven aralıklarının birbirine çok yakın olduğu gözlenmiştir. Ancak bu durumun normal dağılıma sahip veri setleri için böyle olduğu belirtilebilir. Bunun yanı sıra çarpık ve normal dağılıma sahip veri setleri üzerinden ortanca için kestirilen bootstrap güven aralıklarının farklı yöntemlere göre değiştiği görülmüştür (Normal aralık, yüzdelikli aralık, temel aralık ve yanlılık düzeltmeli aralık). Çarpık dağılımlar için “yanlılık düzeltmeli aralık” yönteminin daha doğru sonuç verdiği alan yazında vurgulanmıştır. Ölçek geliştirme sürecinde kullanılan gerçek veri seti üzerinde Cronbach Alfa içtutarlık katsayısı ve madde toplam korelasyonları için hesaplanan bootstrap güven aralıklarının ise oldukça geniş olduğu gözlenmiştir. Bu bağlamda ölçek uyarlama ve geliştirme sürecinde bootstrap güven aralıklarının hesaplanmasının araştırmacılara önemli boyutta yol göstereceği ve daha nitelikli araçların geliştirilmesine katkı sağlayacağı belirtilebilir. Bootstrap örnekleme yönteminin uygulaması pratik olmakla beraber önemli kuramsal temellere dayandığı belirtilebilir. Bu bağlamda ilgili okuyucuların İngilizce tam metinde önerilen kaynaklara ulaşmaları önerilir. Bu çalışmanın araştırmacılara bootstrap örnekleme yöntemini kullanma sürecinde yol göstermesi ve araştırmacıları güven aralıklarını rapor etmeleri konusunda teşvik etmesi beklenmektedir.



Attitudes of High School Teachers to Educational Research Using Classification-Tree Method*

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ABSTRACT

Purpose: The main objective is to investigate high school teachers' attitudes relating to educational research with respect to demographic variables.

Research Methods: The study is based on the relational screening model. Data was obtained through an adapted scale to determine high school teachers' attitudes toward educational research. The study was carried out with 669 teachers working at 11 different branches in metropolitan areas, towns, and counties. The data obtained in this study was analysed by SPSS

(Statistical Package for Social Sciences) for Windows 21.0 program. **Findings:** It was observed that teachers with 1-5 years' occupational seniority showed more sensitivity towards educational research than those who had been working for more than five years. Their tendency to "[follow] scientific journals relating to their study field" was also found to be significant. Additionally, among teachers following scientific journals relating to their field, female teachers showed a greater interest in educational research than male teachers. **Implications for Research and Practice:** Based on these results, in-service training activities should be organised and given to high school teachers who have completed five years in the teaching profession at state schools and in relevant university departments in order to improve the attitudes of teachers towards educational research and encourage teachers to follow publications related to their field.

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Introduction

Scientific research is an information production activity that identifies a problem, plans and implements solutions, draws conclusions, discusses results, and evaluates findings. In this regard, it is necessary that teachers should be willing and capable of carrying out scientific research in the field of education. In this process, teachers may use information and communication technologies, analyse data, and share results with management and other educators. Teachers are responsible for educating students in research skills, problem solving, and critical thinking need to possess these skills. They must also display a positive attitude towards scientific research. Kucukoglu, Tasgin and Celik (2013) determined that concepts related to the research process were not completely understood by teacher candidates who did not think teachers needed to do research; however, they did consider that scientific research may serve them well in their working lives. Kilic and Acat (2007) stated that teacher candidates need to carry out research or contribute to those who apply scientific methods while solving their problems. Korkmaz, Sahin and Yesil (2011a) emphasised that teachers need to keep up with new developments, which requires possessing study skills, contributing to others' studies, and displaying a positive attitude towards research and researchers. In this sense, teachers should create an effective learning environment and use methods and techniques that provide learning opportunities for every student (Kilic, 2006). Educational surveys are important for the career development of teachers (Counsell, Evans, McIntyre & Raffan, 2000). These involve conceptualising, observing, and recording systematically, analysing observed data, and publishing the acquired data (Mortimore, 2000). It is important to know how to utilise meaningful educational surveys and how to obtain current studies (Everton, Galton & Pell, 2000; Ekiz, 2006). If teachers lack study skills and do not examine studies conducted in their field, it is difficult to breed a research culture among their students (Sari, 2006). It is desirable for teachers to utilise educational surveys effectively and to implement various kinds of surveys as an action researcher (Isman, Altinay-Aksal & Altinay-Gazi, 2009; Rossouw, 2009; Sahin & Arcagok, 2013). The most important characteristic of efficient teachers is being up-to-date regarding innovations in their field (Sahin, 2011). Teachers should voluntarily attend educational activities, enabling themselves to be informed about new developments in education (Ucgun & Unal, 2015). The same applies to teacher candidates (Kucukoglu, Tasgin & Celik, 2013). Through these activities, teachers both renew themselves in the working sense and are more beneficial to their students (Genc, 2006). To be teachers today and in the future, they need to produce and consume information actively (Sari, 2006). Efficient teachers should be aware of their own inabilities and perceive development as an obligatory process through which they adopt the philosophy of lifelong learning and development (Can, 2004). However, the literature indicates that teachers do not show much interest in educational research (Sari, 2006). Furthermore, educational research makes very few practical contributions towards solving the problems faced by teachers, administrators, and politicians due to their negative attitude teachers express towards educational research (Everton Galton & Pell, 2002; Hemsley-Brown & Sharp, 2003; McMillan & Schumacher, 2006; Biesta, 2007), whether in the form of journal papers, conference presentations, reports, online sources, or theses. It is extremely important for teachers

to be aware of educational research and benefit from it, as well (Yildirim, Ilhan, Sekerci & Sozbilir, 2013). It has been determined that, by following practical activities, candidate teachers are able to build a bridge between theoretical data and acquisition relating to application (Walter & Han, 2012). Attitudes towards scientific research, in general (Cousins & Walker, 2000; Papanastasiou, 2005; Walker, 2010; Kucukoglu, Tasgin & Celik, 2013; Ates & Yildirim, 2015), or educational research, in particular (Everton, Galton & Pell, 2002; Yavuz, 2009; Ozturk, 2010; Yildirim, et al., 2013; Ucgun & Unal, 2015), have been investigated in studies of candidate teachers, teachers, and educationalists. In a study to determine the use of research results by teachers to address problems and their awareness level of studies concerning school education, Ahduja (2012) found that teachers do not use research findings, have a low awareness level about studies conducted, do not understand the terminology used in research, and have difficulty obtaining published research. There are numerous studies in the literature on educational research and its practical usage. Ekiz (2006) mentioned that the gap between academic culture and application culture arises from teachers' perceptions. Both Hemsley-Brown and Sharp (2003) and Vanderlinde and van Braak (2010) considered it important to find channels of cooperation between researchers and implementers, which would allow them to remain informed about research results. Broekkamp and van Hout-Wolters (2007) proposed that teachers possessing postgraduate education or being informed about scientific research and results via in-service training would be a crucial contribution, and that teachers and researchers should execute research by working together. Ates and Yildirim (2015) found an important gap between research and implementation, exemplified by teachers being unaware of how and where to find scientific research and not being included in the decision-making process, lack of trust by teachers in research and researchers, teachers' negative beliefs in the generalisability of research, and research not reflecting classroom reality. Ekiz and Yigit (2012) reported that teachers merely apply research results when deciding educational implementations due to the communication gap between academics and teachers. According to Joram (2007), teachers believe that educational research lacks reliability because it is prepared within a technical framework. According to findings from interview data relating to teachers' pursuit of educational research, Yildirim et al. (2013) stated that, although some teachers regularly or intermittently follow up educational research, the vast majority have no interest in it. Ekiz and Yigit (2012) found that teachers conveyed "negative or indecisive" opinions on the purpose of educational research and by whom it should be implemented. In addition, teachers' attitudes towards research are important concerning whether they benefit from the findings. Since attitudes have significant directive effects, either positive or negative behaviours may arise as a result (Tavsancil, 2006, p. 72).

The main objective of the present study is to investigate the attitudes of high school teachers relating to educational research with respect to demographic variables, and to determine difference variations in their attitudes according to these demographic variables.

Method

Research Design

As numerous factors affect the attitudes of teachers towards educational research, the relational screening model was chosen as the most appropriate. This model screens the entire population or a sample to construct a general judgment about the population, consisting of many elements (Karasar, 2007). The aim, metaphorically speaking, is to describe a situation related to the research subject by taking photos of it (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2012).

Research Sample

The research group included 699 high school teachers working in various departments and different schools in Istanbul (metropolis), Ardahan, and Kars. Demographic variables of the teachers are presented in Table 1.

Table 1.

Demographic Variables of High School Teachers in Study

		F	%
Gender	Male	298	44.5
	Female	371	55.5
Educational Status	Bachelor's Degree	607	90.7
	MSc (Master of Science) degree	62	9.3
Professional Seniority (years)	1-5	415	62
	6-10	138	20.6
	11-16	65	9.7
	17 or more	51	7.6
Place of Duty	County	90	13.5
	City	367	54.9
	Metropolis	212	31.7
Total		669	

As seen in Table 1, 298 (44.5%) of the teachers were male and 371 (55.5%) female. A total of 607 (90.7%) teachers had a bachelor's degree and 62 (9.3%) a master degree. According to their professional seniority, 415 (62%) teachers had served for under 5

years, 138 (20.6%) had 6-10 years of seniority, 65 (9.7%) had 11-16 years of seniority, and 51 (7.6%) had 17 or more years of professional experience. Regarding the distribution of teachers according to where they work, 90 (13.5%) teachers worked in counties (townships), 367 (54.9%) were located in cities, and 212 (31.7%) worked in the metropolis of Istanbul.

Research Instruments and Procedures

The scale developed by Ilhan et al. (2013) to determine the attitudes of teachers towards educational research was used in this study. The scale, developed for application on primary and high school teachers, consists of three factors and 20 items. A minimum of 20 points can be taken from the scale and the maximum score is 100%. In the process of scoring the scale, the $(n-1) / n$ formula was applied. The falling score was calculated as 0.80 at all levels so all intervals would be equal for all levels. Therefore, the values were determined as 1.00-1.80 "strongly disagree", 1.81-2.60 "disagree", 2.61-3.40 "undecided", 3.41-4.20 "agree", and 4.21-5.00 "strongly agree".

The scale in the 5-point Likert format scored the first and second factors as follows: "Completely Agree (5), Agree (4), Undecided (3), Disagree (2), and Strongly Disagree (1)". The third factor of the scale should be in reverse order, according to the scoring of "Totally Agree (1), Agree (2), Undecided (3), Disagree (4), Strongly Disagree (5)". When the factors in the scale are scored, all statements in the first and the second factors need to be coded evenly because all of them are positive. The statements in the third factor should be encoded in reverse because they consist of negative statements. A high score from the first factor of the scale shows that teachers have positive attitudes towards the necessity of educational research, while a high score from the second factor shows positive attitudes towards valuing educational research. A high score in the third factor can be interpreted that teachers' attitudes on the applicability of educational research are positive.

The Bartlett's test value for the 20-item scale was 3684.944 (190, $p < .001$) and its KMO value was 0.890. The total variance of the scale (three factors and 20 items) was 50.642%. The first factor formed 17.988%, the second factor 16.746%, and the third factor formed 15.907% of the total variance. When the load factor values of the 20 items were studied, it was seen that they were between 0.551 and 0.839. Cronbach's Alpha reliability coefficients of the final version of the scale were 0.841 for the first factor, 0.816 for the second factor, and 0.781 for the third factor; the whole scale was calculated as 0.816. The first level of the scale's confirmatory factor analysis results is as follows: Chi-Square (164, $N = 504$) = 432, $df = 65$, $RMSEA = 0.057$, $RMR = 0.044$, $SRMR = 0.055$, $GFI = 0.92$, $AGFI = 0.90$, $NFI = 0.95$, $CFI = 0.97$. It was, thus, determined that the scale showed a good fit.

Data Analysis

In this part of the research, we checked the distribution of the data obtained before starting the analysis. Since the sample group size was greater than 50, the distribution was checked with the Kolmogorov Smirnow Test (rather than the Shapiro Wilk Test, used for groups smaller than 50) (Koklu, Buyukozturk &

Bokeoglu, 2006), and a normal distribution of p was obtained. If the p -value is ($p < .05$), the data do not show a normal distribution.

As the individuals in the sample may belong to a heterogeneous structure and may come from different populations with regard to scores received from the measurement tool, the dependent variable was subjected to two-step cluster analysis. Two-step cluster analysis is a multivariate statistical method that can analyse continuous and categorical data together (Everit, 1994). Two-step cluster analysis aims to separate the data set into homogeneous subgroups. Statistics obtained after the heterogeneous data set is divided into homogeneous sub-classes or clusters provide healthier results (Kayri, 2007). Two-step cluster analysis can be used on large data sets, especially in research in educational sciences employing a Likert-type questionnaire (Celik, Satici & Celik, 2005; Kayri, 2007). If the variables in the data set are of the same data type, the phase sequential (hierarchical) clustering method is used, while in the case of no prior knowledge about the number of clusters, the non-phase sequential (hierarchical; K-mean) clustering method is used. Where there is a lack of prior knowledge about the number of clusters, two-step cluster analyses should be preferred (Ozdamar, 2002). The total score from the scale was classified as low-medium-high through two-step cluster analysis, and the dependent variable was converted to a categorical variable.

As the dependent variable was a discrete variable, the SRA Classification-Tree Method was used, which offers a structure that affects predictor variables. Visually presenting the results makes this technique superior to other regression techniques (Kayri & Boysan, 2008). Representation of the interaction model in the form of a diagram (sub-trees; node), which provides the expansion of significant relations between independent and dependent variables through the SRA method, is an advantage of this technique (Hébert, Delphine Collin-Vézina, Daigneault, Nathalie Parent & Tremblay, 2006). Additionally, because many parametric methods such as multiple regression analysis accept the data set as a whole as homogeneous, the generalisability and reliability of the parameters estimated by these methods are debatable (Chen & Kou, 2001; Okut, Duncan, Susan & Strycker, 2002).

The recommended method is dividing the universe into homogeneous sub-groups and interpreting each homogeneous sub-class in itself (Kayri & Gokdas, 2006). Outcomes subjected to cluster analysis of data sets consist of three stages: a) cluster distribution table, b) cluster profile table, and (c) frequency table. The frequency distribution table consists of the number of frequencies (n) belonging to each obtained cluster and their percentages. The table of the cluster profile shows the mean values of continuous variables and their standard deviation values. The frequency table includes ratios containing only categorical variable frequencies and percentage values. Through these, the researcher can arrive at detailed information for each generated cluster. Furthermore, as in other classification techniques, the category where each variable in the data set belongs can be calculated. Statistical package programs offer this facility to researchers (Kayri, 2007).

In this study, the cluster analysis technique, which educators can apply to a non-homogeneous data set, was used. As the number of clusters for the universe was unknown, teachers' attitudes toward educational research were examined using the two-step cluster analysis technique, which automatically detects the number of clusters.

Adaptation of the Scale

Before adaption, the original scale (Ilhan et al., 2013) was applied to 270 high school teachers working in different fields. First, exploratory factor analysis was applied to the data obtained. Then, first-level confirmatory factor analysis was applied to data obtained from the exploratory factor analysis results. Following this, the suitability of the model was tested by applying second-level confirmatory factor analysis. Thus, an adaptation of the “Teachers attitude scale towards educational research” to high school teachers was achieved. The findings of the adapted scale are presented below.

Exploratory Factor Analysis (EFA)

Factor analysis is the most powerful method to measure construct validity. It enables measurements to be conducted using far fewer factors by bringing variables measuring similar properties together (Tabachnick & Fidell, 2001). First, Exploratory Factor Analysis (EFA) was performed on the data to test the construct validity of the scale. Then, the Kaiser-Meyer-Olkin (KMO) Sample Competency Test and the Bartlett Globosity Test were applied for the same purpose (Table 2).

Table 2.

KMO and Bartlett Globosity Test Findings

KMO Sample Competency Test		0.881
Bartlett Globosity Test	χ^2	2332.919
	<i>Sd</i>	190
	<i>Sig.</i>	.000

The data were analysed by the KMO and the Bartlett Globosity Test for validity of the data structure for factor analysis in terms of sample size. The value of KMO was determined as .881, while the Bartlett test value was found to be $\chi^2=2332.919$ and the $sd=190$ ($p=.000$). Since a KMO value greater than or equal to 0.60 is considered sufficient to perform factor analysis (Buyukozturk, 2010), it was considered suitable for our 20-item scale. At this stage of the research, the scale consisted of 20 items and three factors. It was determined that the scale items were able to explain 54.02% of the total variance. The item-total correlation of this three-factor scale varied between .455 and .829, and Cronbach's alpha reliability coefficient of the scale was found to be .88.

Considering the items in the three-factor scale, and the factor load range of these items in addition to the reliability coefficients of these factors, it was determined that the first factor varied between 0.603 and 0.720, while its reliability coefficient was found to be .83. The second factor varied between 0.508 and 0.829, and its reliability coefficient was .85. The third factor ranged between 0.455 and 0.768, and its reliability coefficient was .81. The correlation values between factors in the resulting three-factor scale are presented in Table 3.

Table 3.*Analysis Results of Correlation Coefficient between Factors on Original Scale*

	F1	F2	F3
F1	1		
F2	.666**	1	
F3	.389**	.441**	1

**p< .001

Considering the correlation values between factors on the three-factor scale using Pearson correlation coefficient (r), a high positive correlation was found between F1 with F2, while weak positive correlations were found between F1 with F3, and F2 with F3, respectively. According to Pearson correlation coefficient, there is a "very weak" correlation between factors if the value of (r) is between 0.00-0.25, "weak" if between 0.26-0.49, "moderate" if between 0.50-0.69, "high" if between 0.70-0.89, and a "very high" correlation between factors if the value of (r) is between 0.90-1.00 (Kalayci, 2005). Low correlation between factors shows that the factors are independent of each other, which supports the factor structure.

The factor loads of the 20 items in the three-factor scale, eigenvalues, and extent to which they explain the variance related to their reliabilities are presented in Table 4.

Table 4*Factor Analysis Results of 20-Item Three-Factor Adapted Scale*

Factors	Item	Items	F1	F2	F3
(Factor 1) (Necessity of Educational Research)	I3	Educational research contributes to the improvement of education programs.	.720		
	I1	Educational research provides me with useful data I can use in courses.	.707		
	I5	Educational research finds solutions to problems I encounter.	.707		
	I4	Educational research is important for me in choosing teaching models, methods, and techniques.	.664		
	I2	I like seminars about educational research.	.624		
	I6	Research findings on training given in seminars are useful.	.623		
	I7	I enjoy giving lessons through educational research findings.	.603		
(Factor 2) (Valuing Educational Research)	I11	It is necessary to do scientific research about education.		.829	
	I12	Educational research contributes to developing teaching methods.		.757	
	I9	It is important to be informed about educational research.		.693	

Table 4 continued

Factors	Item	Items	F1	F2	F3	
	I10	It is important to receive the benefits of educational research in order to be a qualified teacher.		.658		
	I8	Teachers should benefit from educational research findings.		.510		
	I13	Scientific papers about education (theses, articles, books, etc.) help to increase the level of education.		.508		
(Factor 3) (Applicability of Educational Research)	I16	I think scientific papers about education (theses, articles, books, etc.) are shallow.			.768	
	I17	Educational research is not applicable in the school environment.			.735	
	I19	I don't think educational research is applicable.			.700	
	I18	It is a waste of time trying to give lessons through the results of educational research.			.689	
	I15	Educational studies by academics are only done to help them progress their career.			.663	
	I20	Giving lessons according to educational research findings decreases student success.			.585	
	I14	I cannot finish the topic of the lesson on time when I follow the data of educational research.			.455	
			Value:	3.912	3.481	3.413
			Explained Variant:	19.558	17.404	17.064
			Factors Cronbach Alpha:	.834	.852	.811
			Scale Cronbach Alpha:	.887		

Table 4 shows results of EFA performed on the final three-factor version of the scale. The factor of "Necessity of Educational Research" consisted of seven items; its item-total correlation value varied between 0.603 and 0.720, and its reliability coefficient was .83. The eigenvalue of this factor was 3.912, and its contribution to general variance was 19.55%. The second factor, "Valuing Educational Research", consisted of six items; its item-total correlation value varied between 0.508 and 0.829, while its reliability coefficient was .85. The eigenvalue of this factor was 3.481, and its contribution to the general variance was 17.40%. The third factor, "Applicability of Educational Research", consisted of seven items. Its item-total correlation value varied between 0.455 and 0.768, and its reliability coefficient was .81. The eigenvalue for this factor was 3.413, and its contribution to the general variance was 17.06%. Considering the whole scale, factors were found to explain 54.02% of the variance.

First- and Second-Level Confirmatory Factor Analysis (CFA)

Although Confirmatory Factor Analysis (CFA) is often used for the development of scales and validation analyses, it can also be used to determine the accuracy of a predetermined structure (Bayram, 2010). CFA is frequently used for the development of measurement models and provides significant convenience. It is a process used for forming a latent variable by using the variables observed through a previously-developed model (Jin, Tang, Ma, Lv, Bai & Zhang, 2009). In addition, the model developed can be theoretically determined by the researcher via CFA or can be a model obtained as a result of EFA (Aytac & Ongen, 2012).

As a result of EFA, the data obtained from the 270 students in the sample group using first- and second-level CFA was used to verify the three-factor structure of the adapted scale. There is no consensus on the number of samples needed for CFA (Waltz, Strickland & Lenz, 2010), but it should be 10 times more than the number of items and no fewer than 200 (Kline, 2005). In first- and second-level CFA applied on the data obtained by EFA, several fit indexes, such as the Chi-Square Fit Test (χ^2 / sd), Goodness-of-Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Test (CFT), Normalised Fit Test (NFT), Non-Normalised Fit Test (NNFT) and Root Mean Square Error of Approximation (RMSEA), were used (Sanders, Allen, Forman, Tarpey, Keshavan & Goldstein, 2005).

First-Level Confirmatory Factor Analysis

Firstly, three suppressive variants were determined by the original scale (Necessity of Educational Research, Value Given to Educational Research, and Applicability of Educational Research) and primary CFA for the model, consisting of 20 observable variables. Goodness-of-fit values of CFA and ranges of the fitness criteria are presented in Table 5.

Table 5.*Fitness Criteria of Confirmatory Factor Analysis*

Fit Indices	Perfect Fit	Acceptable Fit	Model
χ^2 / df	$0 \leq \chi^2 / df \leq 2$	$2 \leq \chi^2 / df \leq 3$	1.950
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$	0.059
S-RMR	$0 \leq S-RMR \leq 0.05$	$0.05 \leq S-RMR \leq 0.10$	0.054
IFI	$0.95 \leq IFI \leq 1.00$	$0.90 \leq IFI \leq 0.95$	0.97
NNFI	$0.97 \leq NNFI \leq 1.00$	$0.95 \leq NNFI \leq 0.97$	0.97
NFI	$0.97 \leq NFI \leq 1.00$	$0.95 \leq NFI \leq 0.97$	0.95
CFI	$0.97 \leq CFI \leq 1.00$	$0.95 \leq CFI \leq 0.97$	0.97
GFI	$0.95 \leq GFI \leq 1.00$	$0.90 \leq GFI \leq 0.95$	0.90
AGFI	$0.90 \leq AGFI \leq 1.00$	$0.85 \leq AGFI \leq 0.90$	0.86

As seen in Table 5, first-level CFA goodness of fit values were found as [$\chi^2(sd, N)=422.33; 167, 270$), $\chi^2/sd=2.528$, $RMSEA=0.075$, $S-RMR=0.061$, $GFI=0.87$, $AGFI=0.83$, $NFI=0.92$, $NNFI=0.94$, $IFI=0.95$ and $CFI=0.95$. At the end of primary CFA, analysis of

the modification index and necessary modifications were performed on “item 12 and item 11”, “item 15 and item 16”, and “item 20 and item 18”. The new values obtained from this analysis were [$\chi^2(sd, N)=(319.87; 164, 270)$, RMSEA=0.059, S-RMR=0.054, GFI=0.90, AGFI=0.86, CFI=0.97, IFI=0.97, NNFI=0.97, NFI=0.95]. According to this, the proportion of the chi-squared level to the degree of freedom is (χ^2/df); IFI, NNFI, and the CFI value show a perfect match. Furthermore, RMSEA, S-RMR, NNFI, NFI, GFI, and AGFI scores show acceptable consistence (Schermelleh-Engeland & Moosbrugger, 2003; Sumer, 2000). The most widely-used statistical methods for these values are as follows: Chi-square, GFI, CFI, and RMSEA (Joreskog & Sorbom, 1993). According to the data obtained, there is an acceptable fit of the model. In other words, this model shows that the factors are verified by the data. After modification, the path diagram of Primary CFA and t-values can be seen in Figure 1.

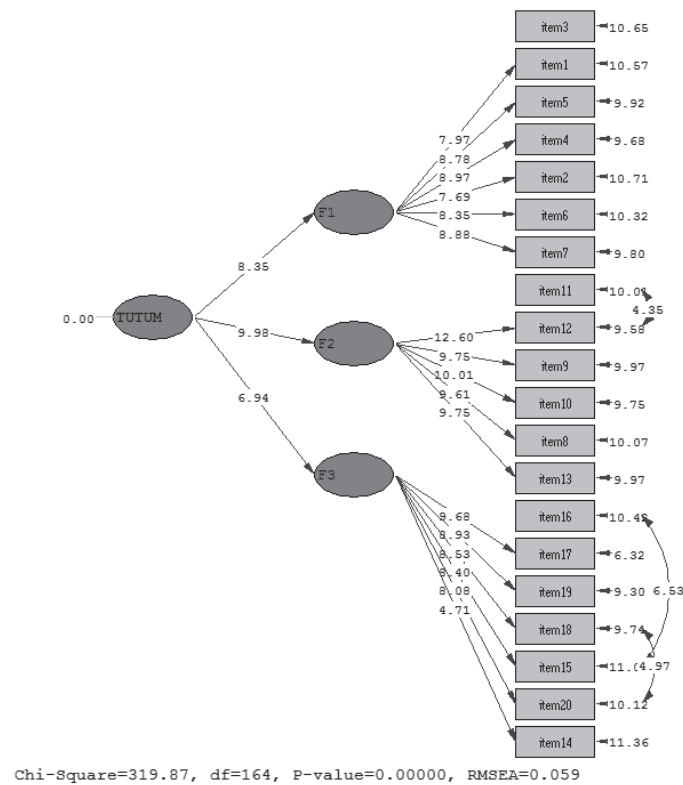


Figure 2. Diagram of Second-Level Confirmatory Factor Analysis of Adapted Scale (t-values)

Note: Tutum: Attitude; F1: Necessity of Educational Research; F2: Valuing Educational Research; F3: Applicability of Educational Research

Factor loads (Lambda λ), t-values, and measurement errors (delta δ) between first-level latent variables and second-level lateral variables, and explanation rates (R^2) of the second-level variable on first-level variables are shown in Table 6.

Table 6.*Second-Level Confirmatory Factor Analysis Values of Adapted Scale*

Second Level Variables	First Level Variable	λ_x	δ coefficient (Measuring Error)	t	R ²
Attitude	Necessity of Educational Research (F1)	0.83	0.31	8.35	0.69
	Valuing Educational Research (F2)	0.89	0.061	9.98	0.93
	Applicability of Educational Research (F3)	0.56	0.60	6.94	0.35

Concerning data given in Table 6, according to the path coefficient (λ_x) and t-values between the first- and second-level lateral variables, there is a positive and significant correlation between attitude and the first factor ($\lambda_x = 0.83$; $p < .05$; $t = 8.35$), second factor ($\lambda_x = 0.89$; $p < .05$; $t = 9.98$), and third factor ($\lambda_x = 0.56$; $p < .05$; $t = 6.94$). If the t-value is higher than 1.96, it is significant at ($p = .05$); if it is higher than 2.56, then it is significant at ($p = 0.001$) (Schumacker & Lomax, 2010). In the model, coefficients related to independent indicator variables predicted by latent independent variables are shown with Lambda x (λ_x), and error coefficients of independent indicator variables predicted by latent independent variables are shown by Theta-Delta (δ). Lambda x (λ_x) coefficients also represent the validity coefficients of the scale (Joreskog & Sorbom, 1993).

Since the t-values of all items and all factors in the model are significant, we can conclude that our model is acceptable. Considering the variances explained in the first-level variables in terms of the second-level variable, the highest variability was in the factor "Valuing Educational Research" ($R^2 = 0.93$), and the lowest variability was in "Applicability of Educational Research" ($R^2 = 0.35$). Typically, values of (R^2) below 0.2 are considered weak, between 0.2 and 0.4 moderate, and above 0.4 strong (<https://www.american.edu/ctrl/>, p. 4). The value of the determination coefficient (R^2) should be specified in the research as per the other fit indexes. Explained variance (R^2) is the coefficient that determines to what extent indicator variables explain changes observed in the latent variables (Kelloway, 1998).

Item Discrimination

In this part of the research, item discrimination levels were determined by calculating the correlations between scores obtained from each item in the factors in accordance with the item-total correlation method and scores obtained from factors. Thus, the capacity of each item in the scale in terms of serving the general purpose of the scale was measured. Item-factor correlation values of each item in the scale are given in Table 7.

Table 7.
Correlation Analysis of Item-Factor Scores of Original Scale

F1		F2		F3	
Item No	r	Item No	R	Item No	r
3	.674**	11	.781**	16	.752**
1	.672**	12	.801**	17	.787**
5	.754**	9	.757**	19	.736**
4	.736**	10	.777**	18	.727**
2	.674**	8	.710**	15	.662**
6	.724**	13	.741**	20	.671**
7	.744**			14	.499**

N=270 **p<.001

As seen in Table 7, item correlations varied between 0.674 and 0.754 for the first factor, between 0.710 and 0.801 for the second factor, and between 0.499 and 0.787 for the third factor. Each item in the factors significantly and positively correlated with the entire scale (p<.001). The coefficients obtained are the validity coefficients for each item in the scale, and they indicate the consistency of the scale. In other words, these coefficients show the capacity of factors in terms of serving the general purpose of the scale.

In order to test the reliability of the subscales by means of CFA, the relationship between items in the measurement tool and the total scores from subscales was analysed, and the item-total correlation was calculated in order to measure the internal consistency of the scale, based on the scores of items and subscales. The results are presented in Table 8.

Table 8*Item-Total Correlations and t-values Regarding 27% Difference between Lowest-Highest Points of Sample Group with Adapted Scale*

Item No	Item-Test Correlation	\bar{X}	SD
I3	.825**	4.39	.697
I1	.860**	4.38	.743
I5	.772**	3.88	.985
I4	.779**	4.25	.720
I2	.763**	4.05	.924
I6	.756**	3.99	.914
I7	.788**	3.99	.944
Factor 1	.856**	4.131	.668
I11	.790**	4.59	.520
I12	.819**	4.47	.589
I9	.784**	4.44	.598
I10	.811**	4.43	.662
I8	.717**	4.45	.643
I13	.773**	4.22	.783
Factor 2	.862**	4.433	.494
I16	.741**	2.90	1.175
I17	.791**	3.17	1.056
I19	.748**	3.22	1.138
I18	.756**	3.68	.868
I15	.650**	2.83	1.125
I20	.699**	3.92	.895
I14	.566**	2.82	1.176
Factor 3	.793**	3.218	.748
Total	1	3.902	.535

** Correlation found significant both ways at level .001

Regarding Table 8, the correlation for the "attitude" scores of high school teachers toward educational research was found to be 0.856 ($p < .001$) for the first factor, 0.862 ($p < .001$) for the second factor, and 0.793 ($p < .001$) for the third factor. We can, therefore, conclude the internal consistency of the tool and that there is construct validity, since the values of the item test correlation coefficients are not negative, equal, or close to zero (Tavsancil, 2005). Thus, we produced a 20-item, 5-point Likert-type measurement tool that evaluates the attitudes of high school teachers regarding Necessity of Educational Research, Valuing Educational Research, and Applicability of Educational Research. The rating range of the scale is between 20 and 100. While calculating the scores, those of items reflecting Necessity of Educational Research and Valuing Educational Research in the first factor (3, 1, 5, 4, 2, 6, 7) and second factor (11, 12, 9, 10, 8, 13), respectively, were coded normally. A higher total score of the first and second factors on the scale indicates positive attitudes toward educational research. Applicability of Educational Research, the third factor (16, 17, 19, 18, 15, 20, 14) on the scale, was reverse-coded. The higher total score of the third factor also shows positive attitudes by high school teachers.

Results

As the individuals in the sample came from diverse levels of the population, the heterogeneous sample was divided into homogeneous sub-clusters. As a result of clustering analysis, it can be seen that the three different groups, which are heterogeneous between each other and homogeneous on their own, were revealed. In addition, the mean standard deviation values differed for each group. The findings of two-step cluster analysis are presented in Table 9 and the findings of the mean and standard deviation values belonging to the clusters are presented in Table 10.

Table 9

Two-Step Cluster Analysis Frequency Findings of Adapted Scale

		F	%
Cluster	1	236	35.3
	2	333	49.8
	3	100	14.9
Total		669	100

The sub-clusters obtained by two-step cluster analysis (Table 9) show that the number of teachers in the low category is 236 (35.3%), 333 (49.8%) in the medium category, and 100 (14.9%) in the high category. Mean and standard deviation values of the clusters are shown in Table 10.

Table 10.

Two-Step Cluster Analysis Findings

		Total	
		M	SD
Cluster	Low	67.88	3.29
	Medium	75.03	2.28
	High	83.18	3.34
	Average	73.73	5.85

The overall average and standard deviation value regarding the attitudes of teachers was calculated as 73.73 ± 5.85 . The attitude of the 236 teachers in the first cluster is $= 67.88 \pm 3.29$, which represents the "Low" attitude in the sample. The attitude of 333 (49.8%) teachers in the second cluster is $= 75.03 \pm 2.28$, which represents the "Medium" attitude in the sample. The attitude of 100 (14.9%) teachers in the third cluster is $M= 83.18 \pm 3.34$, which represents the "High" attitude in the sample. The dependent variable was transformed into a categorical variable by classifying the total score obtained via hierarchical clustering analysis of the scale as low-medium-high.

Modeling the Attitude of Teachers towards Educational Research through Classification-Tree Method

As a result of two-step cluster analysis applied to the total score obtained from the scale data, the scale data fell into three clusters (Low, Medium, High). The score obtained via categorical clustering analysis is the dependent variable of the research. The demographic and independent variables of the teachers, such as gender, educational status, occupational seniority, participating in scientific research, following scientific journals, and place of work, are the independent variables. The findings including these dependent and independent variables are presented in Figure 3.

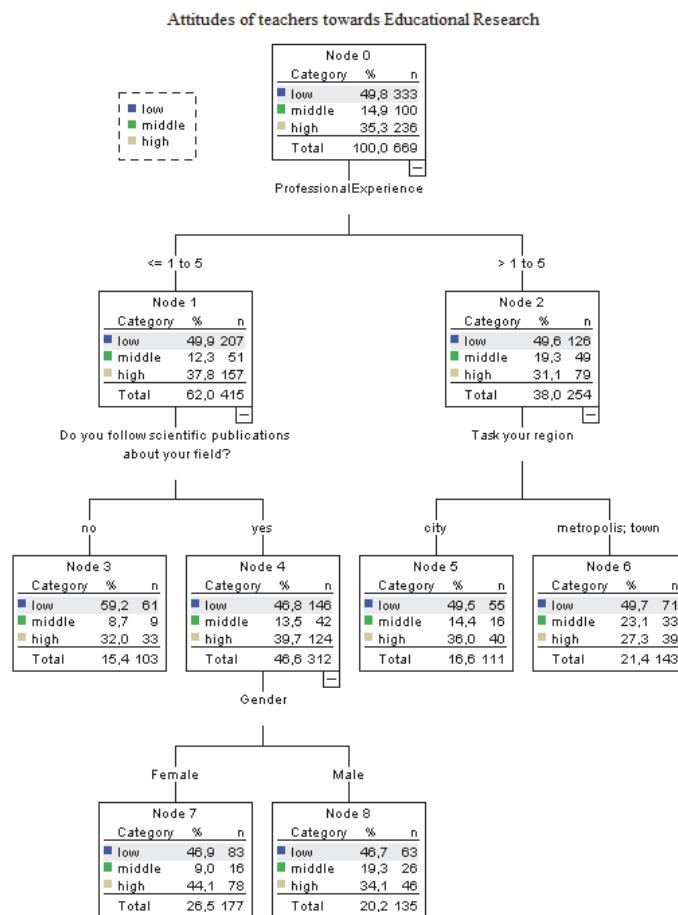


Figure 3. Classification-Tree Diagram Showing the Effect of Independent Variables on Attitudes of Teachers towards Educational Research

In Figure 3, the independent variable showing an effect on the level of the attitudes of teachers towards educational research is seen in the tree structure. The professional seniority of teachers is the major variable affecting the dependent variable. The classification-tree puts professional seniority in two different homogeneous points regarding the attitudes of teachers towards educational research. In the tree, the attitude towards educational research of teachers with 1-5 years of professional seniority (37.8%) is more positive than the attitude of teachers with more than 5 years of professional seniority (31.1%). Similarly, there is a connection between teachers who have been working for more than 5 years and their place of duty. There is also an association between teachers with 1-5 years of experience and teachers who follow journals about their profession. The teachers who follow journals (39.7%) have a more positive attitude than those who do not (32%). The teachers who work in cities (36%) have a more positive attitude than those working in counties or a metropolis (27.3%). In addition, an association between teachers who follow occupational journals and gender was determined. Female teachers who read journals (26.5%) had a higher positive attitude than male teachers (20.2%) towards educational research.

Discussion, Conclusion, and Recommendations

In this study, professional seniority is seen as having a major effect on attitudes towards educational research. Attitudes of teachers with 1-5 years of professional seniority is more positive than teachers with more than 5 years of professional seniority. One reason for this may be that teachers who have just started their career have been closely involved with scientific studies during their undergraduate years. In a study of the attitudes of mathematics teachers towards educational research, Bas (2017) found that teachers with 1-5 years of professional seniority have a positive attitude regarding educational research. Similarly, in their study concerning the attitudes of biology, physics, and chemistry teachers towards educational research, Pekel and Akcay (2016) found that young teachers have a positive attitude regarding educational research. In addition, in their study of the attitudes of primary school teachers towards educational research, Sahin and Arcagok (2013) found that young teachers were willing to practice theoretical knowledge that they had learnt in the preservice period, which encouraged teachers to carry out their own research. Konokman, Tanrıseven and Karasolak (2013) supported this positive attitude by preservice teachers by explaining that they take part in research and communicate with instructors who are carrying out research in education departments. According to Sozbilir (2007), during their teacher training, pre-service teachers debate on scientific platforms, undertake small-scale projects, and follow educational research to improve their level of understanding and put their knowledge into practice. Ekiz and Yigit (2012) emphatically stated that teachers can only execute research if they benefit from scientific research courses before starting their teaching career.

For teachers with 1-5 years of professional seniority, the finding “following journals related to his/her profession” was found to be meaningful. Their more

positive attitude towards educational research is related to the fact that the teachers have only been involved in the profession for under 5 years. Accordingly, teachers who have just started teaching have a more positive attitude towards following education-related journals due to their positive attitudes towards educational research, which shows that they are open to novel ideas. In a study of students, teachers, and researchers, Berber (2013) stated that there is close relationship between a culture of research and being interested in scientific research. Kucukoglu, Tasgin and Celik (2013) stated that the views that pre-service teachers express towards researchers are related to following journals about scientific research, and skills and knowledge about research methods and techniques. Ekiz and Yigit (2012) emphasised that teachers are expected to be aware of the results of educational research and use them effectively in their classes. That teachers have innovative perspectives by following occupational publications related to their individual innovative perceptions. Erdogan and Gunes (2013) also underlined the evidently strong relationship between the innovative perceptions of pre-service teachers and their openness to innovation and new experiences, as also proposed by Demiraslan and Usluel (2008). Teachers should ensure effective uses of technology in the classroom and need to be able to design new educational methods and teaching strategies. Ritchhart (2004) is of the opinion that innovative teachers are able to develop in their profession, try novel approaches in accordance with recent teaching-learning strategies, use different methods to increase student participation, and implement new skills by changing habits. Basaran and Keles (2015) found that the individual innovativeness level of teachers with 1-5 years of work experience was higher than teachers with more than 5 years of professional seniority.

It was found that teachers with more than 5 years of professional seniority and working in cities had a more positive attitude towards educational research, from which we may conclude that these teachers are more conscious about fulfilling occupational responsibilities and, therefore, tend to follow innovations and educational research in order to develop themselves (Korkmaz & Sadık, 2011). In a study of occupational attitudes of teachers working in cities, it was reported that, when teachers increase their competence at blending theory and practice, they succeed in fulfilling the requirements of their profession. (Mooji, 2008) claimed that senior teachers consider the teaching profession as requiring great responsibility, to which Tanrıverdi and Erisen (2010) added that the occupational attitudes of senior teachers are more positive. Furthermore, a result of the study of Basaran and Keles (2015) demonstrated that teachers working in cities are more innovative than teachers employed in counties and towns.

Lastly, the gender variable among teachers who follow occupational journals was found significant, since women were shown to have a more positive attitude towards educational research. Konakman, Tanrıseven and Karasolak (2013) found that the female teachers display more positive attitudes towards their job than male teachers. Female teachers also have a more positive attitude towards scientific research, and their individual inventiveness level is higher than that of males. This is supported by the literature, studies of pre-service teachers have demonstrated that female teachers display more positive attitudes towards their jobs than male teachers (Pehlivan, 2008; Camadan & Duysak, 2010; Ilter & Koksalan, 2011; Aydın & Sağlam, 2012; Ipek, Kahveci & Camadan, 2015).

Teacher attitudes play an important role in fulfilling the requirements of the occupation (Durmusoglu, Yanık & Akkoyunlu, 2009), as attitudes and perceptions towards a profession affect perceptions of professional competence and success in the occupation (Terzi & Tezci, 2007). Studies examining the attitude of teachers towards scientific research are usually performed on pre-service teachers. Korkmaz, Sahin and Yesil (2011b) showed that female pre-service teachers are more willing to help researchers and have a more positive attitude towards research, a finding also underlined by Kurt, Izmirli, Fırat and Izmirli (2011). Basaran and Keles (2015) stated that female teachers are more innovative and inquisitive than male teachers, who are more traditionalist. Traditionalist teachers, it should be noted, have difficulties in using new techniques and approaches in class. It is seen in the study of Ayhan, Tuncay, Sancar, Deniz and Yılmaz (2012) on preservice teachers that there is a significant relationship between gender and innovativeness and that female pre-service teachers are more innovative than male teachers, a point also expressed by Cuhadar, Bulbul and Ilgaz (2013) and Korucu and Olpak (2015), who stated that female pre-service teachers' innovativeness, pioneering and questioning is higher than those of male teachers. In the study of Erdogan and Gunes (2013) of the relationship between the individual innovativeness levels of education faculty students and their level of acceptance of change, it is seen that female teachers are more willing to accept change than male teachers and accept changes earlier than male teachers. It can, therefore, be concluded that female teachers have more positive attitudes towards following journals about their occupation than male teachers because they have more a positive attitude on teaching, scientific research, innovativeness, and acceptance of change, as evidenced by the results of related studies.

According to the study results, in-service training and required activities should be organised and provided for teachers who have completed five years in the teaching profession by the Ministry of National Education and relevant university departments in order to promote teacher attitudes towards education research and the willingness to follow publications related to their fields.

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Lise Öğretmelerinin Eğitim Araştırmalarına Yönelik Tutumlarının Sınıflandırma Ağacı Yöntemi İle İncelenmesi

Atıf

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Özet

Problem Durumu: Bireylere araştırma-inceleme, problem çözme ve eleştirel düşünme becerilerini kazandırmakla yükümlü olan öğretmenlerin öncelikle kendilerinin bu beceri ve yeterliklere sahip olmalarıyla birlikte bilimsel araştırmalara karşı olumlu tutum içerisinde olmaları gerekmektedir. Bu bağlamda öncelikli olarak öğretmenlerin araştırma yapmaya istekli olmaları, bilimsel araştırmalar yapabilmeleri, bilimsel araştırma yaparken bilgi ve iletişim teknolojilerini kullanabilmeleri, verileri analiz edebilmeleri ve analiz sonuçlarını yöneticiler ve diğer eğitimcilerle paylaşabilmeleri gerekmektedir. Öğretmenlerin gelişim ve değişime ayak uydurabilmeleri, öncelikle araştırma bilgi ve becerilerine sahip olmalarını yapılan araştırmalara düşünce ve eylemleri ile katkı sağlamalarını, araştırmalara ve araştırmacılara karşı olumlu bir tutum içerisinde olmalarını gerektirir. Öğretmenlerin mesleki gelişimlerine katkı sağlayacak başlıca kaynaklar ise araştırma süreçlerinin kavramsallaştırılması, gözlemlenmesi ve sistematik olarak kaydedilmesi, gözlemlenen verilerin analiz edilmesi ve elde edilen verilerin yayımlanması olarak tanımlanan eğitim araştırmalarıdır. Bu anlamda, amacı 'eğitim uygulamalarının anlaşılması ve geliştirilmesi olan eğitim araştırmalarından yararlanma yollarının etkin kullanımına ilişkin bilgilerin ve güncel eğitim araştırmalarına ulaşma yollarının öğretmenler tarafından bilinmesi beklenmektedir. Öğretmenlerin kendileri araştırma becerilerinden yoksunlar ise ve alanda yapılan bilimsel çalışmaları etkili bir şekilde incelemiyorsalar yetiştirecekleri bireylerinde araştırma kültürü kazandırmaları çok zordur. Etkili bir öğretilerde bulunması gereken en önemli özellik alanıyla ilgili yenilikleri yakından takip ederek bilgilerini güncellemesidir. Bir öğretmenin ifade edilen bu kazanımları elde etmesi ise öncelikle alanı ile ilgili yapılan eğitim araştırmalarını yakından takip etmesi ile sağlanabilir. Fakat ilgili literatür incelendiğinde, öğretmenlerin eğitim araştırmalarına ilgi göstermediği, yaklaşık olarak bütün çalışmaların ortak sonucu olarak ortaya çıkmaktadır. Eğitim araştırmalarının, özellikle uygulamada yaşanan sorunların çözümüne çok az katkı sağladığı ve uygulayıcılar olan öğretmenlerin eğitim araştırmalarına karşı olumsuz bir tutuma sahip olduğu bilinmektedir. Yapılan bu çalışma ile öğretmenlerin eğitim araştırmalarına yönelik tutumlarında demografik değişkenlerinin etkileri derinlemesine incelenerek, öğretmenlerin eğitim araştırmalarına yönelik tutumlarını olumlu yönde geliştirmek ve bu doğrultuda öğretmenlere önerilerde bulunmak amacıyla konu araştırılmaya değer görülmüştür.

Araştırmanın Amacı: Bu araştırmanın temel amacı, lise öğretmenlerinin eğitim araştırmalarına ilişkin tutumlarını demografik değişkenler açısından incelemek ve öğretmenlerin demografik değişkenlerine göre eğitim araştırmalarına yönelik tutumlarındaki değişimleri belirlemektir.

Araştırmanın Yöntemi: Bu çalışmada, öğretmenlerin eğitim araştırmalarına yönelik tutumları üzerinde etkisi olabilecek bazı değişkenlerin incelenmesi amaçlandığından, tarama modelleri içerisinde ilişki tarama modeli kullanılmıştır. Tarama modeli, “çok sayıda elemandan oluşan bir evrende, evren hakkında genel bir yargıya varmak amacıyla, evrenin tümü ya da ondan alınacak bir grup, örnek ya da örneklem üzerinde yapılan tarama düzenlemeleri” olarak tanımlanmaktadır (Karasar, 2007). Araştırmanın örneklemini büyükşehir, şehir ve ilçe olmak üzere farklı yerleşim yerlerinde görev yapmakta olan 11 farklı branşta toplam 669 öğretmen oluşturmaktadır. Elde edilen verilerin analizinde SPSS 21.0 (Statistical Package for Social Sciences) programı kullanılmıştır.

Araştırmanın Bulguları: Araştırma kapsamında elde edilen bulgulardan, öğretmenlerin eğitim araştırmalarına yönelik tutumları üzerinde en yüksek etkiye sahip değişkenin mesleki kıdem değişkeni olduğu belirlenmiştir. Bu bulguya göre, meslekte 1-5 yıl arası görev yapan öğretmenlerin eğitim araştırmalarına yönelik tutumları meslekte 5 yıl ve üzeri bir süredir görev yapan öğretmenlerden daha yüksek çıkmıştır. Meslekte geçirdiği süre 1-5 yıl olan öğretmenler arasında da “Alanıyla ilgili bilimsel yayınları takip etme” durumu anlamlı bulunmuştur. Ayrıca mesleğinde 5 yıldan fazla bir süredir görev yapan öğretmenler arasında şehirde görev yapan öğretmenlerin eğitim araştırmalarına yönelik tutumlarının daha yüksek olduğu tespit edilmiştir. Son olarak alanı ile ilgili bilimsel yayınları takip eden öğretmenler arasında cinsiyet değişkeni anlamlı bulunmuştur. Alanı ile ilgili bilimsel yayınları takip eden öğretmenler arasında da bayan öğretmenlerin erkek öğretmenlere oranla eğitim araştırmalarına yönelik tutumlarının daha olumlu olduğu belirlenmiştir.

Araştırmanın Sonuçları ve Önerileri: Öğretmenlik mesleğine yeni başlayan öğretmenlerin eğitim araştırmalarına yönelik tutumlarının yüksek olması ve alanları ile yayınları takip etme konusunda daha olumlu bir tutuma sahip olması birbirini destekleyen bulgulardır. Öğretmenlik mesleğine yeni başlayan öğretmenlerin hem eğitim araştırmalarına hem de alanları ile ilgili yayınları takip etmeye yönelik olumlu bir tutum içerisinde olmalarının nedenleri arasında öğretmenlerin gerek lisans eğitimi süresince gerekse meslek öncesi eğitimlerinde bilimsel araştırmalarla ilgili uygulamalar sonucunda edindikleri olumlu tutumlar olabileceği gibi, göreve yeni başlayan genç öğretmenlerin bireysel yenilikçilik algılarının da yüksek olmasının da eğitim araştırmalarına ve alanları ile ilgili yayınları takip etmeye yönelik tutumlarının olumlu yönde etkilediği düşünülmektedir. Buna ek olarak, meslekte uzun süredir görev yapan öğretmenler arasında da şehirde görev yapan öğretmenlerin eğitim araştırmalarına yönelik tutumlarının daha yüksek olduğu tespit edilmiştir. Elde edilen bu sonuç incelendiğinde, şehirde görev yapan ve mesleki kıdemi 5 yıldan fazla olan öğretmenlerin mesleğe yönelik tutumlarının olumlu olduğu ve mesleki sorumluluklarını yerine getirme konusunda daha bilinçli olduğu düşünülmektedir.

Bu durum sonucunda öğretmenlerin mesleki gelişimleri için gerekli yenilikleri takip etme ve kendilerini geliştirmek adına eğitim araştırmalarını incelemeye yöneldiği ve bu durumundan dolayı da şehirde görev yapan ve mesleki kıdemi 5 yıldan fazla olan öğretmenlerin eğitim araştırmalarına yönelik tutumlarının daha olumlu olduğu düşünülmektedir. Son olarak alanı ile ilgili bilimsel yayınları takip eden öğretmenler arasında cinsiyet değişkeni anlamlı bulunmuştur. Alanı ile ilgili bilimsel yayınları takip eden öğretmenler arasında da bayan öğretmenlerin erkek öğretmenlere oranla eğitim araştırmalarına yönelik tutumlarının daha yüksek olduğu belirlenmiştir. Bu durumun muhtemel nedenleri arasında, bayan öğretmenlerin erkek öğretmenlere oranla gerek öğretmenlik mesleğine gerekse bilimsel araştırmalara yönelik tutumlarının daha olumlu olmasından kaynaklandığı düşünülmektedir.

Elde edilen bu sonuçlara göre, öğretmenlik mesleğinde özellikle 5 yılını dolduran öğretmenlere yönelik olarak, gerek Milli Eğitim Bakanlığı gerekse Üniversitelerin ilgili birimleri tarafından hizmet içi eğitim faaliyetleri düzenlenerek, öğretmenlerin eğitim araştırmalarına ve alanları ile ilgili yayınları takip etmeleri konusunda ki tutumlarını geliştirici etkinlikler yürütülmelidir.

Anahtar Kelimeler: Lise öğretmenleri, eğitim araştırmaları tutum, sınıflandırma ağacı yöntemi, birinci ve ikinci düzey doğrulayıcı faktör analizi



The Effect of Coordinated Teaching Method Practices on Some Motor Skills of 6-Year-Old Children *

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ABSTRACT

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Keywords

movement education, methods in physical activity, coordinated teaching in physical education, Sport education, Games education,

Purpose: This study was designed to examine the effects of Coordinated Teaching Method activities applied for 10 weeks on 6-year-old children, and to examine the effects of these activities on the development of some motor skills in children.

Research Methods: The “Experimental Research Model with Pre-test and Post-test Control Group” was used in the study. To examine the effects of the Coordinated Teaching Method activities on the development of some motor skills in children, the agility, quickness, throwing a tennis ball, controlling the ball with feet, throwing a ball to a ring, and turning coordination motor performance tests were used.

Findings According to the statistical results, no significant differences were identified between the pre-test values of the experimental group and the control group, and between the averages of the pre-test and post-test values of the control group. Although a significant difference was found between the pre-test and post-test values in favor of the post-tests in the experimental group, significant differences were found at various levels between the post-test values of the experimental and control groups in favor of the experimental group.

Implications for Research and Practice: It has been shown that planned and long-term coordinated teaching activities can make children more active, develop the motor skills of 6-year-old children, and bring them up to an upper level education in terms of psychomotor development levels, and the efficiency of the intragroup and intergroup social relations will be developed at an optimum level.

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Introduction

The effect of the advancement and development in scientific, technological, educational, and social fields is also rapidly, effectively, and functionally reflected in the fields of sports sciences and movement education. As for an outlook on movement education, along with the integration of recent developments into this field, it is of great importance to increase the functionality of the educational methods used in learning-teaching environments to provide an effective and efficient education as well as increase the activities of children for their participation in educational activities. "Practices of movement education are regarded as the overall activities aiming at developing the physical and motor competences and perceptual motor developments of children as well as improving their movement skills."

It has been reported that throughout the period of activities in which children are actively involved, children's basic movement skills positively affect their physical awareness, motor aptitudes (strength, coordination, speed, agility) and physical aptitudes (flexibility, strength, endurance) as well as increase their socialization levels (Kosel, 1994; Schilling & Kiphard, 1974; Prätorius & Milani, 2004; Kiphard, 1970). One of the most effective methods for improving muscle groups during lessons involving games and physical activities in primary school is education through coordination. Hollmann and Hettingere (1976) defined coordination as the harmony between the central nervous system and the musculoskeletal system for the targeted movement (Hollmann & Hettinger, 1976), whereas according to Gallahue (1982), it is the skill of concertedly integrating different motor systems with the varying sensations while the organism creates an effective series of movements (Gallahue, 1982). Jalcuer (1993) defined coordination as "a system arranging the cooperation among systems", but when considered in terms of physiology, this is expressed as "the intermuscular and intramuscular cooperation" (Hirtz, 2002). The more complex the movement becomes, the higher level the coordination necessary for a good performance reaches (Roth & Winter, 1994; Kiphard, 1972). Coordination in contemporary sports sciences is one of the significant factors that determines the technique, and it is reported to be defined as the activity performed fluently, rapidly, and favourably in accordance with the purpose to learn and develop sports skills and attain a certain maturity level (Hirtz, 1985). In line with this, coordination can be defined as "the ability to react quickly to challenging actions in various situations within a short span of time by serving the purpose as well as the ability to teach or learn by maintaining the muscular harmony through internal processes."

Modern sports scientists use the term "co-ordinative abilities" in general rather than using the terms, "skill and agility." Co-ordinative abilities are known to be the determinants of performing and teaching a challenging action or movement as well as being the identifier of how rapidly an action or movement is taught (Bös & Wohlmann, 1987). As for the education of co-ordinative abilities, particularly in training for children, in each warm-up stage and in all the technical training performed later on, co-ordinative activities should be performed in the form of games and skills exercises to develop conditional characteristics (Wellnitz & Hirtz, 1983; Meinel & Schnabel, 2007). Coordination practices are more efficient at an earlier

age and the processes of receiving information and processing concepts and information weaken with age (Altfeld, 1998; Kiphard, 1970). Harre (1982) identified coordinative abilities as balancing ability, rhythm ability, integration ability, reaction ability, sense of direction, and sorting ability (Harre, 1982).

This research was conducted to present the effects of the activities performed in primary schools on the social fields and the development of muscle groups and motor skills of six-year-old children; the involved activities were based on the method of education through coordination performed during the lesson involving games and physical activities in primary schools.

Method

Research Design

This research used an experimental pretest-posttest design including a control group and the relationships between the dependent variable and a series of independent variables were examined. The effect of coordination was determined to be the independent variable to be investigated, and the effect of the lesson involving games and physical activities based on the educational method on the development of motor skills was the dependent variable.

Research Sample

In line with the purpose of the research, the subjects selected for the study consisted of students enrolled in the 1st Grade of primary school and who had no problem in attending the school. Half of the 60 children incorporated into the research comprised the control group, while the other half formed the experimental group. The parents of all the students were informed about the study, and the study was started after the necessary permissions from the involved parents had been received. The children were randomly assigned to the experimental and control groups.

Research Instruments and Procedures

The coordination courses were designed and performed with the active participation of the children in activity classes, sports halls, and the school yard in accordance with the characteristics of the practices. The measurements and assessments were performed with the help of three individuals involving a researcher, assistant, and an interviewer who processed the scores received from the tests into the form. The collection of the data was performed in four stages:

Preliminary study. The activities based on the educational method through coordination performed during the research were prepared in accordance with the characteristics of motor skills by also considering expert opinions. Before the commencement of the activities based on the educational method through a 10-day-coordination, a preliminary study was performed for the purpose of applying the test instructions; arranging the measurement and assessment

environments; calculating the mean duration per test; and testing the measurement tools to allow all the subjects involved to start the pre-tests on the same level.

Application of pre-tests. According to the results of the preliminary study, the pre-tests were performed by separating them into five days by being arranged in a way that the tests of both groups would follow one another. The pre-tests included motor performance skills tests of agility, swiftness, tossing a tennis ball, controlling the ball by foot, throwing a ball into the ring, and footrace coordination, and the pre-test measurements and assessments were, thus, completed.

- Day 1 included tests on “agility” and “tossing a tennis ball”,
- Day 2 included a “swiftness” test,
- Day 3 included a “controlling the ball by foot” test,
- Day 4 included a “footrace coordination” test, and
- Day 5, included a test on “throwing a ball into the ring”.

When the motor performance skill tests were performed, the movements were demonstrated once, with attention drawn to the characteristics of the movements, and then the instructions of the test tools were explained. During the trials, the children were provided with feedback, re-adjustments, and reinforcers.

Performing the physical education program. During the study period, the activities based on the educational method through coordination, which had a rich content and in which there were activities for developing motor skills, were performed after the pre-test assessments on the experimental group during the hours of Games and Physical Activities course for a total period of 10 weeks comprising five course-hours per week, by also promoting the students’ activeness and activities in participating in these events. The control group performed the Games and Physical Activities course regularly for a period of 10 weeks in line with the activities included in their annual program.

Application of post-tests. To identify the effectiveness of the educational method through coordination used as the method of education during the Games and Physical Activities course in the 1st Grade of primary school and to assess whether some of the motor skills were developed, the post-tests were combined with the test procedures and test tools for motor performance skills applied during the pre-test period.

Data Analysis

During the research period, the statistical package program was benefited from in obtaining the research results. An “independent t” test was used to identify the difference between the experimental and control groups, while “paired samples t” statistical tests were used to determine the within-group differences between the experimental and control groups. The statistical significance levels varied according to motor performance tests.

Results

The data obtained from the statistical tests were analyzed, and the general findings are presented in light of the development of motor properties observed during the application.

Table 1

Pre-Test Values for the Motor Skill Performances of the Experimental and Control Groups

Test	Group	n	Mean ± SD	T test		
				t	sd	p
Agility	Experimental	30	7.03 ± .60	2.13	58	.487
	Control	30	7.10 ± .75			
Swiftness	Experimental	30	6.71 ± .64	1.87	58	.294
	Control	30	6.69 ± .69			
Tossing a Tennis Ball	Experimental	30	8.95 ± 3.20	.83	58	.161
	Control	30	9.01 ± 3.01			
Controlling the Ball by Foot	Experimental	30	40.04 ± 4.88	3.47	58	.452
	Control	30	41.01 ± 5.11			
Throwing a Ball into the Ring	Experimental	30	3.86 ± .57	.64	58	.347
	Control	30	3.71 ± .61			
Footrace Coordination	Experimental	30	5.84 ± .41	-2.81	58	.95
	Control	30	5.80 ± .43			

As shown in Table 1, the result of the “independent t” test to determine whether there was any significant difference among the test averages of the pre-tests of the tested motor performance skills for the experimental and control groups showed that the differences between group averages were found to be statistically insignificant ($p > 0.05$).

Table 2.

Pre-Test and Post-Test Values for the Motor Skill Performances of the Control Group

Test		N	Mean ± SD	T test		
				t	sd	p
Agility	Pre-test	60	7.10 ± .75	.91	29	.240
	Post-test		6.81 ± 1.01			
Swiftness	Pre-test	60	6.69 ± .69	1.14	29	.287
	Post-test		6.58 ± .84			
Tossing a Tennis Ball	Pre-test	60	9.01 ± 3.01	1.39	29	.074
	Post-test		9.10 ± 2.94			
Controlling the Ball by Foot	Pre-test	60	41.01 ± 5.11	.92	29	.142
	Post-test		43.54 ± 4.01			
Throwing a Ball into the Ring	Pre-test	60	3.71 ± .61	.41	29	.354
	Post-test		3.51 ± 1.11			
Footrace Coordination	Pre-test	60	5.80 ± .43	-.04	29	.426
	Post-test		5.94 ± .87			

As shown in Table 2, according to the pre- and post-test findings of “paired samples t” test of the control group, the difference between group averages was found to be insignificant ($p > 0.05$).

Table 3
Pre-Test and Post-Test Values for the Motor Skill Performances of the Experimental Group

Test		N	Mean \pm SD	T test		
				t	sd	P
Agility	Pre-test	60	7.03 \pm .60	9.12	29	.000
	Post-test		6.09 \pm .55			
Swiftness	Pre-test	60	6.71 \pm .64	8.36	29	.000
	Post-test		5.99 \pm .49			
Tossing a Tennis Ball	Pre-test	60	8.95 \pm 3.20	5.87	29	.000
	Post-test		11.01 \pm .91			
Controlling the Ball by Foot	Pre-test	60	40.04 \pm 4.88	7.24	29	.000
	Post-test		34.01 \pm 2.01			
Throwing a Ball into the Ring	Pre-test	60	3.86 \pm .57	5.45	29	.000
	Post-test		4.41 \pm .31			
Footrace Coordination	Pre-test	60	5.84 \pm .41	6.13	29	.000
	Post-test		4.81 \pm .30			

As shown in Table 3, according to the pre- and post-test findings of "paired samples t" test of the experimental group, a statistically significant difference was found ($p < 0.001$). The differences in question showed up in favour of the post-tests.

Table 4
Post-Test Values for the Motor Skill Performances of the Experimental and Control Groups

Test	Group	n	Mean \pm SD	T test		
				t	Sd	P
Agility	Experimental	30	6.09 \pm .55	9.46	58	.009
	Control	30	6.81 \pm 1.01			
Swiftness	Experimental	30	5.99 \pm .49	8.61	58	.000
	Control	30	6.58 \pm .84			
Tossing a Tennis Ball	Experimental	30	11.01 \pm .91	5.01	58	.007
	Control	30	9.10 \pm 2.94			
Controlling the Ball by Foot	Experimental	30	34.01 \pm 2.01	6.41	58	.000
	Control	30	43.54 \pm 4.1			
Throwing a Ball into the Ring	Experimental	30	4.41 \pm .31	4.12	58	.035
	Control	30	3.51 \pm 1.11			
Footrace Coordination	Experimental	30	4.81 \pm .30	5.93	58	.000
	Control	30	5.94 \pm .87			

As shown in Table 4, among the post-test values of the “independent t” test of the experimental and control groups, a statistically significant difference on the level of .001 ($p < 0.001$) was found among the mean test values of Agility, Controlling the Ball by Foot, and Footrace Coordination; a statistically significant difference on the level of 0.01 ($p < 0.01$) was found among the test averages of Tossing a Tennis Ball and Agility; and a statistically significant differences on the level of 0.05 ($p < 0.05$) was found between the test averages of Throwing a Ball into the Ring. The differences in question showed up in favour of the experimental group.

Discussion, Conclusion, and Recommendations

The results of the present study conform to the results of previous studies. Studies by Rutledge (1993) and Parish, Rudisill and Onge (2007) noted that the activities on movement education performed through planning and for a long term were of importance for the education and development of motor skills when compared with leisure game activities, whereas they concluded that the game environment was not a determinant in acquiring motor skills. Results of other studies have shown that the development of motor skills, physical development, and physical aptitude components proved to be higher in children on whom different movement education models were performed (Kerkez, 2004; Dursun, 2004; Altinkok, 2006; Kerkez, 2006; Ozturk, 2009; Celebi, 2010; Fuchslocher, Romann & Gulbin, 2013; Boz, 2011; Altinkok 2015; Altinkök, 2016). Korkmaz & Erol (2004) concluded that the teachers educated and trained in Turkey did not support the coordinative abilities during the learning-teaching processes at a necessary and sufficient level.

The findings of this study show that the motor skill development of the experimental group was significant compared to the control group, which suggests that the contribution of the course based on the educational method through coordination produced a better development of motor skills than the course involving Games and Physical Activities performed on the control group. Including the activities based on the educational method through coordination during the learning-teaching process in the Games and six-year-old children. It has been reported elsewhere that children who don't attain higher activity levels develop cardiovascular problems during adulthood (Bower et al., 2008; Chatratli, 2002; Sandercock, Angus & Barton, 2010). Attaching importance to the activity programs performed during childhood and allowing children to participate in recreation activities during this period will subsequently ensure an active adulthood (Gray, Ty-Am & Judy, 2003; Jimmy, 2003).

Considering the results of the other studies, determining the appropriate time and place of the applied movement education and recreative activities and arranging them in a way that they will be beneficial for children are critically important. Such activities should be supported by government entities and private organizations (Ballard, 2004; Tzuriel & Egozi, 2010). It follows that, apart from clearly touching on the importance of the practices on movement education for developing muscles of the psychomotor field, the effects of the educational methods used here and the

activity levels of the children observed during these practices are, indeed, quite great. This study has shown that the coordination applied along with the educational method had a positive effect on the children's motor skill development.

During the games and physical activities courses, primary school teachers should often include activities in which children can manipulate various objects by using their larger and smaller muscles, thus, providing their bodily coordination for the purpose of promoting their control over objects as well as their visual perceptions. Researchers should plan studies that test the educational programs on visual perception involving activities in which larger and smaller muscles are actively used by children and educational programs in which children become more active at each stage of the activities, use their extremities more harmoniously with one another, and develop the coordinative abilities of their bodies.

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Koordinasyon ile Öğretim Yöntemi Uygulamalarının 6 Yaş Çocuklardaki Bazı Motor Becerilere Etkisi

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Özet

Problem Durumu: Bilim, teknoloji, eğitim ve sosyal alanındaki ilerleme ve gelişmelerin etkisi, hızlı, etkili ve işlevsel olarak spor bilimleri ve hareket eğitimi alanlarına da yansımaktadır. Çocukların aktif olarak katıldığı etkinlikler süresince çocukların, temel hareket becerileri, beden farkındalığı, motor ve fiziksel uygunluğunun yanı sıra sosyalleşme düzeylerindeki artışı da olumlu yönde etkilendiği bilinmektedir. Son gelişmelerin spor bilimi ve hareket eğitimi alanına entegre olması ile birlikte etkili ve verimli bir öğretim için hareket eğitimine bakış, öğrenme-öğretme ortamındaki kullanılan öğretim yöntemlerinin işlevselliği ile çocukların etkinliklere katılımındaki aktifliğin artırılmasının önemini ortaya koymaktadır. İlkokuldaki oyun ve fiziki etkinlikler dersinde, büyük ve küçük kas gruplarını geliştirmek için kullanılan en etkili yöntemlerden birisi de koordinasyon ile öğretim yöntemidir. Koordinatif yeteneklerin eğitiminde; özellikle de çocuk dönemi antrenmanlarında, her ısınma evresinde ve sonrasında bütün teknik antrenmanlar da kondisyonel özelliklerin geliştirilmesi için, oyun ve beceri alıştırmaları şeklinde yapılmakta iken, koordinasyon çalışmalarının erken yaşlarda daha verimli olduğu, yaş ilerledikçe bilgi alma, kavram ve bilgiyi işletme süreçlerinin zayıfladığı ifade edilmektedir. Fakat alanyazına bakıldığında özellikle beden eğitimi alanında öğrenme-öğretme sürecinde kullanılan öğretim yöntemlerini inceleyen ve geliştiren araştırmaların az olduğu belirlenmiş, bu araştırma alanyazına katkı sağlayarak öğrenme-öğretme süreci içinde kullanılan öğretim yöntemlerinin etkililiğini belirleyerek ortaya konulması açısından önemlidir.

Araştırmanın Amacı: beden eğitimi derslerinde uygulanan 10 haftalık koordinasyon ile öğretim yöntemine dayalı etkinlikleri, öğrenme öğretme sürecinde 6 yaşındaki çocuklara uygulayarak, çocukların bazı motor becerilerinin gelişimine etkisini araştırmak amaçlanmıştır.

Araştırmanın Yöntemi: Araştırmada, "ön test - son test kontrol gruplu deneysel araştırma modeli kullanılmıştır. Çalışma grubundaki, 6 yaş ilkokul 1. sınıf, 30 deney ve 30 kontrol grubu olarak toplam 60 öğrenci, okul yönetimine ve ailelerine gerekli bilgilendirmeler yapıldıktan sonra çocuklarında kendi istekleri doğrultusunda araştırmaya dâhil edilmiştir. Araştırmada beden eğitimi derslerinde uygulanan koordinasyon ile öğretim yöntemine dayalı fiziksel etkinliklerin çocuklardaki bazı motor becerilerin gelişimine etkisini araştırmak için; çeviklik, çabukluk, tenis topu

fırlatma, ayak ile top kontrol, halkaya top atma ve koşu koordinasyon motor performans testleri uygulanmıştır. Verilerin çözümlenmesinde istatistik paket programı kullanılmıştır. Deney ve kontrol gruplarının ön test ve son testleri arasındaki farklılığı bulmak için “bağımsız grup t” kullanılır iken, deney grubunun ön test - son test ve kontrol grubunun ön test - son test aralarındaki farklılığı bulmak için ise “eşleştirilmiş grup t” istatistik testleri kullanılmıştır. Araştırmada veriler; koordinasyon parkurları, aktivite sınıfı, spor salonu ve okul bahçesinde çocukların da aktif katılımı ile çalışmaların özelliklerine uygun olarak dizayn edilerek uygulanmıştır. Ölçümler; araştırmacı, ölçüm yardımcısı ve testlerden alınan puanları forma işleyen bir röportör olmak üzere üç kişi ile yapılmıştır. Verilerin toplanması dört aşamada gerçekleştirilmiştir.

- 1- Ön çalışma
- 2- Ön testlerin uygulanması
- 3- Koordinasyon ile öğretim yöntemine dayalı etkinlikleri içeren beden eğitimi programının uygulanması
- 4- Son testlerin uygulanması

Araştırmanın Bulguları: İstatistik sonuçlarına göre, deney ve kontrol gruplarının ön test; çeviklik, çabukluk, tenis topu fırlatma, ayak ile top kontrol, halkaya top atma ve koşu koordinasyon “bağımsız grup t” testi sonucunda, ortalamalar arasında istatistiksel olarak anlamlı fark bulunamamıştır ($p>0,05$). Kontrol grubu ön-son test; çeviklik, çabukluk, tenis topu fırlatma, ayak ile top kontrol, halkaya top atma ve koşu koordinasyon “eşleştirilmiş grup t” testi sonucunda, ortalamalar arasında istatistiksel olarak anlamlı fark bulunamamıştır ($p>0,05$). Deney grubu ön-son test; çeviklik, çabukluk, tenis topu fırlatma, ayak ile top kontrol, halkaya top atma ve koşu koordinasyon “eşleştirilmiş grup t” testi sonucunda, ortalamalar arasında son testler lehine istatistiksel olarak anlamlı fark bulunmuştur ($p<0,001$). Deney ve kontrol gruplarının son test; çeviklik, çabukluk, tenis topu fırlatma, ayak ile top kontrol, halkaya top atma ve koşu koordinasyon “bağımsız grup t” testi sonucunda, ortalamalar arasında deney grubu lehine farklı düzeylerde istatistiksel olarak anlamlı fark bulunmuştur. ($p<0,05$; $p<0,01$; $p<0,001$).

Araştırmanın Sonuçları ve Öneriler: Araştırmada, deney grubuna uygulanan koordinasyon ile öğretim yöntemine dayalı aktiviteleri içeren beden eğitimi derslerinin, kontrol grubuna uygulanan beden eğitimi derslerine göre, motor becerin gelişimine katkısının daha yüksek olduğu gözlemlenmiştir. Beden eğitimi dersindeki öğrenme-öğretme sürecinde Koordinasyon ile öğretim yöntemine dayalı aktivitelere yer verilmesi, 6 yaş çocukların motor becerilerinin gelişimine etkisinin daha yüksek olduğu söylenebilir. Aktivite seviyelerinin yüksek olmasına dikkat edilmeyen çocukların, ileriki dönemlerde bazı sorun problemlerinin ortaya çıkabileceği, çocukluk döneminde yapılan fiziksel aktivite programlarına önem verilmesi ve bu dönemde, aktif yaşamın ve rekreatif etkinliklere katılımın ileriki yaşlarda aktif bir yetişkinliği sağlayabileceği düşünülmektedir. Sonuç olarak; plânlı, uzun süreli ve çocukların aktif olarak uygulamalara katılımının sağlanacağı, koordinasyon ile

öğretim yöntemi etkinliklerinin, 6 yaş çocukların motor becerilerini geliştirmesinin yanı sıra bu dönemdeki çocukları bir üst eğitim kademesine, psikomotor gelişim evreleri yönünden ve grup içi ve gruplar arası sosyal ilişkilerin etkililiği noktasında, optimum düzeyde bir birey olarak yetiştirilebileceği anlaşılmaktadır. Öğretmenlere; büyük ve küçük kasları kullanarak vücut koordinasyonunu sağlayan etkinliklere daha fazla zaman ayırmaları gerektiği, araştırmacılara ise; çocukların daha aktif olduğu ve vücudun koordinatif yetilerini geliştirmeye yönelik eğitim programlarını test eden araştırmalar planlamaları önerilebilir.

Anahtar Kelimeler: Hareket eğitimi, fiziksel aktivitede yöntemler, beden eğitiminde koordinasyon öğretimi, spor eğitimi, oyun eğitimi



**Effect of Health Warnings on Cigarette Pockets on Behaviour:
Educational Perspective**

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ABSTRACT

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Keywords

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Purpose: Health warnings printed on cigarette packets are an important vehicle in that they demonstrate and inform people of the threats and health risks related to smoking. Increasing the effectiveness of this vehicle is one of the purposes of this study. **Research Methods:** Since this research aims to describe the associations between dependent and independent variables and determine whether or not independent variables influence dependent variables, it is a correlational study in the category of descriptive research. The research group was composed of 848 randomly chosen undergraduate students. The data were collected through a questionnaire used in similar research. Path analysis and logistic regression analysis were employed in the analysis of the data.

Findings: According to the findings, the variables of response efficacy, self-efficacy, probability of harm and the severity of harm have high rates of explanation in both groups, but are higher in the combined warning group. It is apparent that the severity of harm and probability of harm will not be influential in behaviours in both groups without the variable of the instrument of fear. The reason for this is that fear can be associated with the function of the moderator.

Implications for Research and Practice: In conclusion, it may be stated that the written text warnings and combined warnings printed on cigarette packets can be influential (and combined warnings are more influential) in preventing individuals from smoking. Enlarging this project and applying it to different groups is important in terms of understanding the durability of the relevant behaviour.

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Introduction

Tobacco, usually consumed in the form of cigarettes, is one of the most widespread addictive substances in the world (American Cancer Society, 2006; Ertekin & Cakmak, 2001). When considered globally, half of men and one tenth of women consume tobacco products. Only a small portion of smokers give up smoking (Dogan, 2001). It is predicted that deaths caused by tobacco will doubled and thus will climb up to 10 million in the next 20–30 years. Furthermore, if the trend continues in this way, a billion people will lose their lives from tobacco use in the 21st century. It is worrying that these deaths will happen primarily to people who are younger than 70 years old and from developing countries (Fidan, Sezer, Demirel, Kara & Unlu, 2006; Prabhat, Phil & Peto, 2014). Tobacco use is the leading cause of death in the world. Five million people died due to tobacco use in the world in 2009. This is more than the total deaths caused by tuberculosis, HIV/AIDS and malaria combined. Tobacco use causes 18 different illnesses in addition to 10 different types of cancer (Ogel, Coraplioglu & Sir, 2004; Telli, Aytemur, Ozol & Sayiner, 2004).

In Spain, most deaths stem from cigarette smoking. In England, the number of people who died due to smoking is ten times higher than the number who died in the Second World War. According to the data offered by the Lung Association, more than 400,000 people, including smoking mothers' premature babies and passive smokers, are impacted by diseases caused by cigarettes every year in the USA. The U.S. spends over 2 million dollars on the treatment of these diseases (Lindstrom, 2008). Turkey is one of the leading countries in the world in terms of cigarette consumption (Yorgancioglu & Esen, 2000). The reason for this is that tobacco use has become part of cultural tradition rather than habit (Kaya & Cilli, 2002). Research conducted by the Ministry of Health in 2010 demonstrated that 48% of men and 15% of women smoke in Turkey (Ministry of Health, 2010). Therefore, it is thought that 100,000 people lose their lives every year due to illnesses caused by smoking (Erguder, 2008). The situation is similar in many parts of the world. For this reason, the need to conduct international studies and to take necessary precautions such as printing health warnings on cigarette packets has been recognised. Health warnings concerning public health were determined in accordance with article 11 of the framework convention of tobacco control of the World Health Organisation (WHO). More than 165 countries have confirmed the convention so far (Ministry of Health, 2008).

In 2001, Canada was the first country in the world to print a combined (text and graphic) warning covering 50% of a cigarette packet. Canada also determined warnings in addition to the ones recommended by the Framework Convention on Tobacco Control (FCTC) and printed them on cigarette packets. The recommendation that combined warnings should cover at least 50% of a cigarette packet made by the FCTC was put into practice by more than 30 countries. Turkey signed the FCTC in 2004. Accordingly, it was made obligatory in Turkey to print written warnings that cover 30% of the front surface and 40% of the back surface of cigarette packets in 2006, which was followed by mandatory printing of combined warnings in 2011. Furthermore, the EU demanded that written warnings covering 30% of the front and

40% of the back of cigarette packets be printed in 2003. It was reported that those new written warnings raised awareness in smokers and that detailed written warnings helped to increase the level of perception of health risks (Hammond, 2011).

Many research studies proved the effectiveness of photos and images on cigarette packets in health education. Thus, health warnings on packets are referred to as potential vehicles that positively affect individuals' attitudes and behaviours (Strahan, White & Fong, 2002). Ozsahin et al. (2007) conducted a study on 3342 patients who consulted the Family Practice Centres of Baskent and Adana Universities in order to quit smoking. The results indicated that 25% of women quit smoking for no stated reason, whereas 30% quit due to health problems or doctors' advice. The study also showed that 45% quit smoking because of mass media or anti-smoking campaigns. On the other hand, it was found that 10% of men quit smoking for no stated reason, 60% due to health problems or doctors' advice, and 25% because of mass media or campaigns.

Tobacco control experts emphasise that combined health warnings should be ensured to stimulate a strong negative instinctive reaction in smokers and non-smokers, and that these warnings reduce the potential attractiveness of cigarette packets. It was made obligatory in Australia in 2006 to print combined warnings on cigarette packets. In a long-term study performed with 7-12th-grade students, it was found that the warnings had been read, attracted attention, made the subjects think about the issue and led to relevant discussion (White, Webster & Wakefield, 2008). Hymowitz, Cummings, and Hyland (1997) tried for five years to identify why 13,415 people had quit smoking. Individuals included in their research reported their reasons for quitting smoking were most of all health problems (91%), the price of cigarettes (60%), their exposure of others to cigarette smoke (56%), and the wish to set a model in the family (55%). Some experimental research shows that combined warnings are more influential than written text warnings in discouraging new smokers and making smokers quit (Sabbane, Bellavance & Chebat, 2009). For instance, in research conducted in China in 2008, smokers reported that combined warnings were more influential than written warnings in motivating people to quit smoking and to prevent youth from smoking (Fong, Hammond & Yuan, 2010).

Smokers report that health warnings on cigarette packets raise awareness (Alaouie, Afifi, Haddad, Mahfoud & Nakkash, 2015). Data obtained from cohort studies showed that in many countries knowledge about cigarettes is learned from the warning printed on cigarette packets rather than from television or other sources. In Thailand, Australia and Uruguay, for instance—where large combined warnings are printed on cigarette packets—85% of smokers pointed to cigarette packets as sources of information on health. Findings showed that warnings with small writing might not be remembered (Hammond, 2011). Hammond reported that more than 90% of Canadian young people were considerably informed on the effects of smoking on health and that smoking became less interesting to youth 6 years after the obligation to print warnings on cigarette packets was introduced. Hammond (2011) points out that similar results were obtained in other research studies performed in Canada. Research on the effects of written and combined warnings on

the Internet, which was conducted with 296 non-smoker secondary school students, found that combined warnings were more effective in improving memory and in triggering it (Hammond, 2011). In research conducted by Ozkaya, Edinsel Ozkaya and Hamzacebi (2009), students analysed all the warnings on cigarette packets carefully and considered them very important. It was found accordingly that 38.9% of the participants thought the warnings to be positive, whereas 61.1% thought that they would not have positive impacts. Of these students, 22.5% quit smoking after they had read the warnings, 44.4% were affected by the warnings but did not stop smoking, and 33.1% were not influenced by the warnings and continued smoking.

Health warnings on cigarette packets are important instruments in that they exhibit the health threats introduced by smoking. An individual smoking a packet of cigarettes a day has the opportunity to see the warnings about 7,000 times a year. The warnings on the packets are considered stimulants of fear. A stimulant of fear is a persuasive message activating the receptors in an individual against threats affecting his/her life in a negative way (Johnston & Warkentin, 2010; Rogers, 1975). On examining the models developed in relation to the effects of the stimulants of fear, variables such as severity, probability of harm, severity of harm, response efficacy and self-efficacy are observed.

Protection Motivation Theory (PMT)

One of the studies concerning Protection Motivation Theory was performed by Rogers (1975), who considered the variables of severity, fragility and efficacy of response in the theory. Maddux and Rogers (1983) regulated the model for the theory. The difference in the re-specified model was that it also took the variable of self-efficacy into consideration. In their research describing the associations between the variables of the PMT, Ruitter, Abraham and Kok (2001) reported significant correlations between self-efficacy, efficacy of response and behaviour. Conducted meta-analyses confirm the PMT and indicate that variables have significant effects on behaviours (Floyds, Dunn & Rogers 2000; Milne, Sheeren & Orbell, 2000). Tanner, Hunt and Eppright (1991) presented evidence that threat prediction and coping processes were composed of an interrelated series. Their research also offered evidence that if individuals perceived the severity of harm and probability of harm at high levels, the incident would result in a feeling of fear stemming from threat prediction. Arthur and Quester (2004) re-considered the PMT and extended it. The PMT that had been specified by Arthur and Quester (2004) also considers the variables of self-efficacy and efficacy of response on top of probability of harm and severity of harm (see Figure 1).

Figure 1. Arthur and Quester's (2004) Protection Motivation Theory

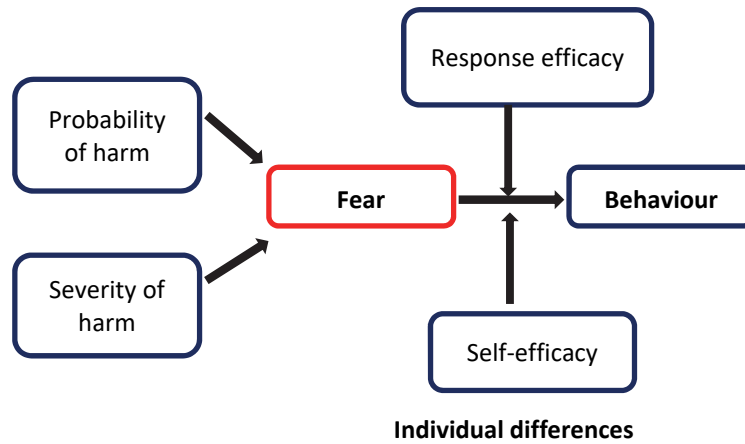


Figure 1. Arthur and Quester's (2004) Protection Motivation Theory

According to Arthur and Quester (2004), fear is a mediating variable that carries impact of severity of harm and probability of harm to behaviour. It is predicted that self-efficacy and efficacy of response will result in modification of behaviour. The authors tested their revised theory under different circumstances. As a consequence, they found that the model fitted well and that there were significant associations between the components. However, the effects of response efficacy were not confirmed in the model, except for some special circumstances. The PMT was based on the stimulants of fear approach. Many studies conducted in foreign countries were performed on the basis of PMT (Milne et al., 2000). Although there are studies conducted to understand the effect of such stimulants on smoking behaviour, there is no research considering the PMT in Turkey.

Research Problem

This study analyses the effects of written text warnings and combined warnings printed on cigarette packets on smoking behaviour in terms of various variables such as the severity of harm, probability of harm, fear, and efficacy of response. Accordingly, the sub-problems were stated as follows:

1. What are the path coefficients in the path analysis of the variables for the written text and combined warning groups?
2. At what levels do the scale scores of fear, severity of harm, probability of harm, efficacy of response, self-efficacy and behaviour predict smoking or not smoking?

Method

Since this study aims to describe the associations between dependent and independent variables and whether or not independent variables influence dependent variables, it is a correlational study in the category of descriptive research.

Research Sample

The research was conducted with 872 participants who were randomly chosen from university students. Of the participants, 77% were female and 23% were male students. In the selection of the participants, the number of students in each faculty was taken into consideration, and care was taken to include a large enough number of students to represent each faculty. Because the questionnaire was long, volunteers were asked to take part in the application. Yet, some of the individuals were excluded from the research because they did not give answers to some questions or they gave systematic answers despite the precautions. Consequently, the research was conducted with 848 students.

Research Instrument, Validity and Reliability

The data were collected with a questionnaire that had been used by Petersen and Lieder (2006) in a similar study. The questionnaire was composed of two parts and 66 items in total. The first part contained items about demographic properties (such as age, gender, grade level and whether or not he/she smokes), and the second part contained items about dependent and independent variables. The questionnaire was first translated into Turkish, and then reliability and validity analyses were performed. The questionnaire was translated by four field experts and two language experts. After the necessary adjustments were made, the questionnaire was reviewed and checked grammatically by a Turkish language expert. Later, the questionnaire was back-translated into the original language by two experts. The resulting two questionnaires were compared, and thus the final shape was given to the Turkish version. The reliability research found that the internal consistency coefficient calculated for each variable ranged between 0.53 and 0.98, that it had an internal consistency at an acceptable level in measurements for the variable of behaviour, and it had an internal consistency at high levels for the other variables. For validity research, the measurement model for each variable was tested with confirmatory factor analysis, and it was found that construct validity was attained. In the goodness of fit statistics for the models established for the variables, AGFI was found to be between 0.92 and 0.99, RMSEA to be between 0.041 and 0.074, CFI to be between 0.92 and 1.00 and χ^2/df to be between 2.50 and 3.02. It was seen in this study that the internal consistency coefficients calculated for each variable were between 0.71 and 0.98, that the internal consistency was at acceptable levels for measurements for the variable of behaviour and in a similar vein that the other variables had an internal consistency at high levels. The measurement model for each variable was tested through confirmatory factor analysis in the validation stage of the research, and thus it was found that construct validity was achieved. It was also found that the goodness of fit statistics for the models established were as follows: AGFI between 0.79 and 0.95, RMSEA between 0.09 and 0.75 and CFI between 0.98 and 1.00.

Similarly, explanatory factor analysis was done for each variable, and the internal consistency coefficient was calculated for reliability. The analysis results of the dependent variable were as follows:

- In the variable of fear, the first dimension accounted for 77% of the total variance, and it displayed a one-dimensional structure. The factor loads of the items in this variable ranged between 0.84 and 0.92 and Cronbach's alpha internal consistency coefficient was 0.96.

The analysis results of the independent variables were as follows:

- In the severity of harm variable, the first dimension accounted for 87% of the total variance and it displayed a one-dimensional structure. The factor loads of the items in this variable ranged between 0.90 and 0.95, and Cronbach's alpha internal consistency coefficient was 0.98.
- In the probability of harm variable, the first dimension accounted for 75% of the total variance and it displayed a one-dimensional structure. The factor loads of the items in this variable ranged between 0.80 and 0.90, and Cronbach's alpha internal consistency coefficient was 0.95.
- In the efficacy of response variable, the first dimension accounted for 84% of the total variance and it displayed a one-dimensional structure. The factor loads of the items in this variable ranged between 0.89 and 0.93, and Cronbach's alpha internal consistency coefficient was 0.97.
- The variable of self-efficacy displayed a two-dimensional structure, and the two dimensions accounted for 72% and 5% of the total variance, respectively. The factor loads of the items on the first dimension were between 0.71 and 0.84, whereas the factor loads of the items on the second dimension were between 0.60 and 0.84. Cronbach's alpha coefficients were 0.97 for the first dimension and 0.98 for the second dimension.
- The variable of behaviour was considered separately for smokers and for non-smokers, and the first dimension accounted for 66% of the total variance for smokers and 57% for non-smokers, and they displayed a one-dimensional structure within their respective categories. The factor loads of the items in this variable were between 0.75 and 0.85, and Cronbach's alpha internal consistency coefficient was 0.89 for smokers and 0.71 for non-smokers.

Research Procedure

The students participating in the research were divided almost equally into two groups. By drawing lots, one of the groups was impartially assigned to be the written text warning group (A; 469), and the other to be the combined warning group (B; 379). For the education stage of the research, six written and six combined warnings were chosen impartially from 14 warnings determined by the Tobacco and Alcohol Market Regulatory Authority (TAMRA) (TAMRA, 2013). The selected warnings were placed on off-brand cigarette packets. The impartially selected warnings for the A and B groups were: "Protect children: Do not make them inhale your smoke," "Carcinogens such as benzene, nitrosamine, formaldehyde, and hydrogen cyanide

are present in cigarette smoke," "Smoking causes fatal lung cancer," "Smoking makes skin age earlier," "Smoking blocks blood vessels, and it causes heart attacks and paralysis," "Smokers die at a younger age," "Smoking causes painful and slow deaths." Figure 2 shows examples prepared for the A and B warning groups. Next, the packets were prepared for the A and B groups separately in the form of presentations. Having received the permissions required, the written text warning presentation for group A and the combined warning presentation for group B were given in the classrooms for 25 minutes each. The questions asked were answered in both groups before and after the presentations. At the end of the presentations, students' thoughts and feelings were obtained through a questionnaire distributed to them. The administration lasted approximately one class hour. The application of the research was performed between September 2014 and April 2015.



Example of Written Text Warning Example of Combined Warning

Figure 2. Examples of Written Text and Combined Warnings Used in the Study

Data Analysis

Path and logistic regression analyses were performed for the solution of the first and second sub-problems, respectively. Path analysis aims to make parameter estimations by means of the solution of a system of equations by using multiple regression or linear algebra. Thus, the partial effects of exogenous variables on endogenous variables are represented with standardised regression coefficients (Cokluk, Sekercioglu & Buyukozturk, 2010). Analysis results were considered separately for each model; and regression coefficients, Wald values, the significance

levels of Wald values and the percentages of accurate classification were used for evaluating the significance of the models and the variables.

Results

Table 1 shows the correlations between variables as well as the averages and standard deviations for the variables. As expected, it may be said that there is a positive and significant correlation between fear and the severity of harm variables ($r= 0.563$) at the 0.01 error level and that the variable has significant but low level correlations with the other variables. The correlation between the variables of self-efficacy and behaviour was found to be positive as expected and significant at the error level of 0.01 ($r= 0.628$).

Table 1.

Correlations between Variables, the Averages and Standard Deviations for the Variables

Stimulants	Fear	Severity of harm	Probability of harm	Efficacy of response	Self-efficacy	Behaviour
Fear	1,000	,563**	,198**	,099**	,180**	,116**
Severity of harm		1,000	,084*	,152**	,211**	,185**
Probability of harm			1,000	,079*	-,069	-,135**
Efficacy of response				1,000	,135**	,110**
Self-efficacy					1,000	,628**
Behaviour						1,000
Averages	26,76	36,76	18,98	30,84	77,04	16,44
Std deviations	22,234	24,665	15,663	21,136	20,062	5,006

* $p < 0,05$ ** $p < 0,01$

According to the results of the path analysis:

- The chi-square calculated for the written text warning group (A) was 10.08, and the degree of freedom (df) was 4. Accordingly, the ratio of chi-square to df was 2.52. The ratio – which is below 3 – perfectly indicates the model-data fit. On examining the RMSEA calculated for the written text group, a fit index at the level of 0.063 is seen. The fact that the index is below 0.07 also shows a good fit in terms of the model data fit (Cokluk et al., 2010; Steiger, 2007).

- The chi-square calculated for the combined warning group (B) was 14.88, and the degree of freedom (*df*) was 4. Accordingly, the ratio of chi-square to *df* was 3.72. The fact that the ratio is below 5 and above 3 indicates a medium level of model fit (Cokluk et al., 2010; Sumer, 2000). On examining the RMSEA calculated for the combined warnings group, it was found that a fit index was at the level of 0.095. The fact that the index is below 0.1 shows that the fit is not high but is at an acceptable level (Cokluk et al., 2010; Kelloway, 1989).

Table 2 shows the standardised values for the written text (A) and the combined warning (B) groups in accordance with the purpose of the research. A close examination of Figure 3 makes it clear that the path coefficient between fear and the severity of harm (β : 0.49; $t > 1.96$) for the written text warnings group (A) and the path coefficient between fear and the probability of harm (β : 0,21; $t > 1,96$) are statistically significant. Accordingly, it may be said that as the severity of harm and/or probability of harm increase(s), there may be significant increases in fear. The probability of harm and severity of harm together explain 31% of the variable of fear. Therefore, it may be said that perceptions of the probability of harm and severity of harm explain fear at high levels. In addition to that, the path coefficient for the severity of harm is -0.0026 ($t < 1.96$), and the path coefficient for the probability of harm is -0.0011 ($t < 1.96$) without the variable of fear. According to these findings, it is evident that there is no direct effect on the severity of harm and probability of harm on behaviour.

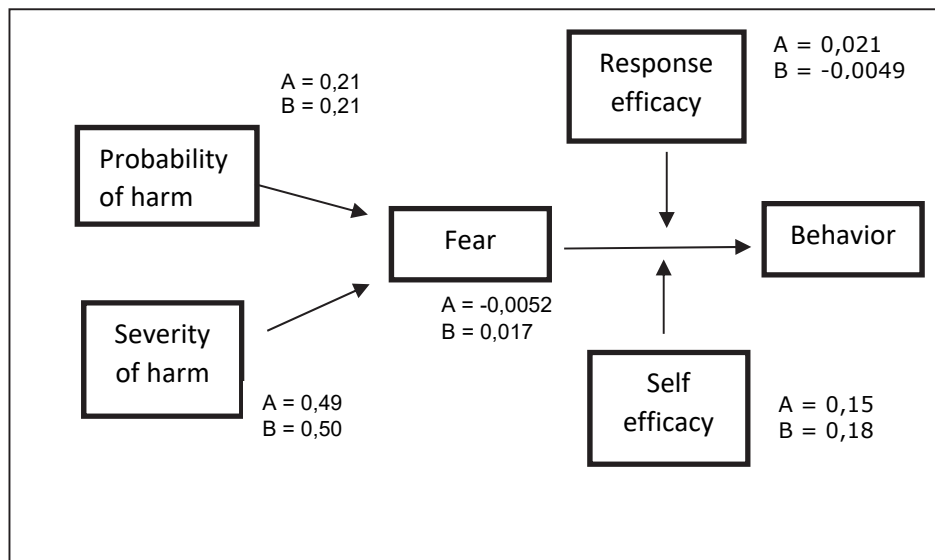


Figure 3. Standardised Path Coefficients (A: Written Text Warnings Group, B: Combined Warnings Group)

It is apparent that the path coefficient calculated for fear and behaviour in group A is -0.0052 ($t < 1.96$), which is not statistically significant. Yet, the path coefficient calculated for self-efficacy and behaviour ($\beta: 0,15$; $t > 1.96$) and the path coefficient for response efficacy and behaviour ($\beta: 0,02$; $t > 1.96$) are statistically significant. These three variables altogether explain 40% of the variable of behaviour, which may be interpreted to be high. Accordingly, it may be said that the variables of fear, self-efficacy and response efficacy altogether have important effects on the emergence of behaviour in the written text warning group.

As is clear from Figure 3, the path coefficients calculated for fear and the severity of harm ($\beta: 0.50$; $t > 1.96$) and for fear and the probability of harm ($\beta: 0.21$; $t > 1.96$) in the combined warnings group (B) are statistically significant. Accordingly, it may be said that fear can also increase significantly as the severity of harm and/or the probability of harm increase(s). The probability of harm and severity of harm together explain 38% of the variable of fear. Thus, it may be said that the perceptions of probability of harm and severity of harm explain fear at a high level. In addition to that, the path coefficient of the severity of harm and the path coefficient of the probability of harm to behaviour are 0.0083 ($t < 1.96$) and 0.0035 ($t < 1.96$), respectively. According to these findings, it may be said that the severity of harm and the probability of harm are not influential in behaviour without the variable of fear.

It is clear from Figure 3 that the path coefficient for fear and behaviour is 0.017 ($t < 1.96$), the path coefficient for response efficacy and behaviour is -0.0049 ($t < 1.96$) and that they are not statistically significant. The coefficient for self-efficacy and behaviour, on the other hand, is 0.18 ($t > 1.96$), and this is statistically significant. These three variables altogether explain 46% of the variable of behaviour, which may be said to be a high rate. Accordingly, it may be interpreted that the variables of fear, self-efficacy and response efficacy altogether have important effects on the emergence of behaviour.

In the solution of the second sub-problem of the research, the students' scale scores (fear, the severity of harm, the probability of harm, response efficacy, self-efficacy and behaviour) were considered as independent variables and whether students smoked or not was considered as the dependent variable in the logistic regression analysis. Table 2 shows the results for the logistic regression analysis. Table 2 shows the regression coefficients (B) calculated for the scale scores, Wald statistics, freedom degrees, significant levels (p) and odds rates. An examination of the significance levels of Wald statistics and the direction of B coefficients shows that the probability of harm is positive and significant at the level of 0.01 and self-efficacy and behaviour are negative and significant at the level of 0.01, whereas all other variables are not significant based on the Wald values.

Table 2.

The Results for Logistic Regression Analysis in Relation to Whether Students Smoke or Do Not Smoke

<i>Stimulants</i>	<i>B</i>	<i>Standard deviation</i>	<i>Wald statistics</i>	<i>Degree of freedom</i>	<i>p</i>	<i>Odds rates</i>
Fear	-0,002	0,013	0,038	1	0,845	0,998
Severity of harm	-0,016	0,012	1,770	1	0,183	0,985
Probability of harm	0,046	0,014	10,013	1	0,002	1,047
Response efficacy	-0,001	0,012	0,003	1	0,955	0,999
Self-efficacy	-0,050	0,010	22,796	1	0,000	0,951
Behaviour	-0,354	0,048	54,852	1	0,000	0,702
Constant	5,803	0,840	47,683	1	0,000	331,275

Accordingly, the regression equation of independent variables for the dependent variable can be formed as followings:

$$U = 5.80 + (-0.002*\text{fear}) + (-0.016*\text{severity of harm}) + (0.046*\text{probability of harm}) + (-0.001*\text{response efficacy}) + (-0.05*\text{self-efficacy}) + (-0.354*\text{behaviour}) + \text{error}$$

With the U value being calculated for a student with the help of this equation, the students' probability of smoking can be found. The value of the probability obtained can be compared with the 0.50 criterion, and thus students can be grouped. Thus, participants with a probability of .50 or larger were classified as smokers, and those with probabilities smaller than .50 were classified as non-smokers. It is clear from Table 2 that the variables of the probability of harm, self-efficacy and behaviour are statistically significant in predicting whether or not individuals smoke ($p < 0.01$), but that the variables of fear, the severity of harm and response efficacy are not statistically significant ($p > 0.05$).

It is also apparent from the analysis results that the rate of explained variance is 0.734 according to Nagelkerke R² value. This coefficient shows that it explains approximately 73% of the variance in the dependent variable for the case of smoking with the model established. It would be useful to state that independent variables' rate of explaining the dependent variable is high. On the other hand, based on the equation formed, 97.5% of non-smokers and 71.6% of smokers can be grouped accurately, which results in a mean of 94.4% correct classification for the combined groups. It may be said the rate of classification is quite high.

Discussion and Conclusions

Previously conducted studies emphasise that the fear stimulants on cigarette packets are important (Alaouie et al., 2015). This study found that the path coefficients from the probability of harm and the severity of harm to fear are significant for both groups. Accordingly, as the severity of harm and the probability of harm increase, fear can also significantly increase. The probability of harm and the severity of harm variables explain 31% of the variable of fear in the written text warnings group, and 38% in the combined warnings group. Accordingly, the probability of harm and the severity of harm variables have high levels of effectiveness rates among both groups, but the rate is higher in the combined warnings group. It is also apparent that the severity of harm and the probability of harm variables cannot be influential in behaviour in both groups without fear. When fear, self-efficacy and response efficacy variables are considered together, they explain 40% of the variance in behaviour in the written text warnings group and 46% of the variance in the combined warnings group. Research reports made it clear that the combined warnings were read and noticed by more by smokers (Alaouie et al., 2015; Kees, Burton, Andrews & Kozup, 2010). Our research results are also consistent with the ones in the literature. On the other hand, self-efficacy and response efficacy variables have important influences on the emergence of behaviour. Strahan et al. also reported that health warnings on cigarette packets are a potential vehicle affecting individuals' attitudes and behaviours in positive ways (Strahan et al., 2002; White et al., 2008). On the other hand the reason why the severity of harm and the probability of harm are not influential in behaviour in the absence of fear is that fear can be considered as having a moderator function for smoker and non-smoker students (Glock & Kneer, 2009). According to Arthur and Quester (2004), the emergence of fear depends on fear stimulants—the severity of harm and probability of harm—and it takes on the duty of a mediator variable among the variables. Although the fear warning on cigarette packets are important, it is observed in studies that both the written text warning and the combined warnings fail to persuade individuals into the expected behaviour. This research has also obtained similar results. According to cognitive inconsistency theory, smokers ignore reality while using tobacco, and they even prohibit it from their sub-consciousness (Festinger, 1957). Moreover, many addicts tend to underestimate the illnesses caused by tobacco use. Thus, individuals keep smoking although they know that smoking is harmful. This denial might have removed the fear aroused in the research and prevented participants from acquiring the relevant behaviour. In conclusion, it may be stated that the written text warnings and combined warnings printed on cigarette packets can be influential (combined warnings are more influential) in preventing individuals from smoking. Enlarging this project and applying it to different groups is important in terms of understanding the durability of the relevant behaviour.

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Sigara Paketleri Üzerindeki Sağlık Uyarılarının Davranışa Etkisinin Değerlendirilmesi: Eğitimsel Bir Yaklaşım

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Özet

Problemin Durumu: Dünyada sigara tüketimi bakımından başta gelen ülkelerden biri de Türkiye'dir. Bunun nedeni tütün kullanımının alışkanlıktan çok geleneksel hale gelmesidir. Dünya ölçeğinde ele alındığında, günümüzde halen erkeklerin yarısı, kadınların ise onda biri tütün ürünleri kullanmaktadır. Tütünün neden olduğu ölümlerin 20-30 yıl içinde iki katına yani 10 milyona çıkması öngörülmektedir. Bu şekilde devam ederse yaşadığımız yüzyılda ise tütün kullanımından bir milyar kişinin hayatını kaybedeceği düşünülmektedir. Bu ölümlerin 70 yaşından önce ve gelişmekte olan ülkelerde olacağı öngörülmesi ayrı bir kaygı verici noktadır.

Yapılan birçok araştırmada sigara paketleri üzerinde fotoğraf ve imgelerin kullanılmasının sağlık eğitiminde etkinliği gösterilmiştir. Paketler üzerindeki sağlık uyarıları bireyde tutum ve davranışı olumlu yönde etkileyen potansiyel bir araç olarak gösterilmektedir. Başkent ve Adana Üniversiteleri Aile Hekimliği Polikliniklerine başvuran 3342 hasta üzerinde yapılan araştırmada kadınların %25'inin nedensiz, %30'unun sağlık sorunu nedeniyle veya doktor tavsiyesiyle, %45'inin medya ve sigara karşıtı kampanyalarla sigarayı bıraktıkları görülmüştür.

Paketler üzerindeki sağlık uyarıları sigaranın riskleriyle ilgili tehditlerin ortaya konması ve bilgi vermesi bakımından önemli bir araçtır. Günde ortalama bir paket sigara içen bir kişi uyarıları yılda 7000 kez görme durumunda kalır. Sigara paketleri üzerinde yer alan uyarılar, korku uyarıcısı olarak görülmektedir. Korku uyarıcısı yaşamı olumsuz etkileyen tehditlere karşı bireyin alıcılarını uyandıran ikna edici mesaj ya da mesajlardır. Korku uyarıcılarına yönelik geliştirilen modellerde şiddet, zarar olasılığı, zararın şiddeti, tepki yeterliği, öz yeterlik vb. değişkenler göze çarpmaktadır.

Alan yazında yapılan birçok çalışma Koruyucu Motivasyon Teorisi (KMT) üzerine kurulmuştur. KMT korku uyarıcılarının etkisini inceler. Modellerde, değişkenlerin sigara içen bireylerin sigara içme davranışları üzerinde bir etkisi olup olmadığı ortaya konulmaya çalışılmış olsa da bizim dışımızda Türkiye'de KMT'yi temel alan başka bir çalışmaya rastlanmamıştır.

Araştırmanın Amacı: Bu araştırmada, sigara paketlerinde yer alan yazılı ve birleşik uyarıların zararın şiddeti, zarar olasılığı, tepki yeterliği, korku ve öz yeterlik değişkenlerinin sigara içip içmeme davranışı üzerindeki etkisi incelenmiştir. Buna göre alt problemler aşağıdaki şekilde belirlenmiştir.

1. Yol analizi sonuçlarına göre değişkenlerin yol katsayıları yazılı ve birleşik uyarı gruplarında nasıldır?
2. Zararın şiddeti, özyeterlik, zarar olasılığı, korku, tepki yeterliği ve davranış ölçek puanları sigara içip içmemeyi ne düzeyde yordamaktadır?

Araştırmanın Yöntemi: Bu araştırma, betimsel araştırmalar kapsamındaki ilişkisel araştırma türündedir. Birinci alt problemin çözümünde yol analizi, ikinci alt problem için ise lojistik regresyon analizi kullanılmıştır. Araştırma üniversitesi öğrencileri arasından tesadüfi örnekleme tekniği ile seçilen 872 kişi üzerinden yürütülmüştür. Araştırmaya katılan öğrencilerin %77'sini kadın, %23'ünü erkek öğrenciler oluşturmaktadır. Veriler, Petersen ve Lieder (2006) geliştirilen bir ölçekle toplanmıştır. İki bölümden oluşan ölçeğin; birinci bölümde kişisel özellikler (cinsiyet, yaş, sınıf, sigara içme durumu), ikinci bölümde ise KMT'ye ait bağımsız ve bağımlı değişkenlerin belirlenmesine için 66 madde yer almaktadır. Araştırmaya katılan öğrenciler yaklaşık eşit olacak şekilde iki farklı gruba ayrılmışlardır. Kura çekme tekniğinden yararlanarak bu gruplardan biri yansız biçimde araştırmanın yazılı uyarı grubu (A; 469); ikincisi ise birleşik uyarı grubu (B; 379) olarak belirlenmiştir. Araştırmanın eğitim aşaması için Tütün ve Alkol Piyasası Düzenleme Kurulu (TAPDK) tarafından belirlenen 14 yazılı ve birleşik uyarıdan altı yazılı ve altı birleşik uyarı yansız biçimde seçilmiştir. Etik ve uygulama izinleri alındıktan A

grubunda yazılı uyarı sunumu ve B uyarı grubunda ise birleşik uyarı sunusu ortalama olarak 25 dakika boyunca dersliklerde açıklanarak gösterilmiştir. Her iki grupta da sorulan sorulara cevap verilmiş ve öğrenci görüşleri ölçek yoluyla toplanmıştır. Uygulama ortalama olarak bir ders saati sürmüştür. Araştırma Eylül 2104-Nisan 2015 arasında uygulanmıştır.

Araştırmanın Bulguları: Araştırmanın birinci alt problemine göre yazılı ve birleşik uyarı gruplarındaki değişkenler arasındaki ilişkiler, beklendiği gibi korku değişkeni ile zararın şiddeti değişkenli arasında pozitif yönlü ve 0,01 hata düzeyinde anlamlı bir ilişki olduğu ($r = 0,563$); bu değişkenin diğer değişkenlerle ilişkisinin ise anlamlı ancak düşük düzeyde olduğu söylenebilir. Özyeterlik ve davranış değişkenleri arasındaki ilişki de beklentiye uygun şekilde pozitif yönlü ve 0,01 hata düzeyinde anlamlı olarak bulunmuştur ($r = 0,628$).

Araştırmanın ikinci alt problemin çözümünde öğrencilerin ölçek puanları (zararın şiddeti, özyeterlik, zarar olasılığı, korku, tepki yeterliği ve davranış) bağımsız; sigara içip içmeme ölçek puanları için hesaplanan regresyon katsayıları (B), Wald istatistikleri, serbestlik dereceleri, önemlilik düzeyleri (p) ve odds oranları görülmektedir. Wald istatistiklerinin önemlilik düzeyleri ile B katsayılarının yönü incelendiğinde ölçek puanlarından; zarar olasılığı değişkeninin pozitif yönde ve 0,01 hata düzeyinde; özyeterlik ve davranış değişkenlerinin ise negatif yönde ve 0,01 hata düzeyinde anlamlı oldukları görülürken; diğer değişkenlere ilişkin Wald değerlerinin anlamlı olmadığı görülmektedir.

Araştırmanın Sonuçları ve Önerileri: Yapılan araştırmalarda sigara paketlerinin üzerindeki korku uyarıcılarının önemli olduğu vurgulanmaktadır. Bu çalışmada yazılı ve birleşik uyarı grubunda zarar olasılığı ve zararın şiddeti ile korku arasındaki yol katsayılarının manidar olduğu görülmektedir. Buna göre zararın şiddeti ve zarar olasılığı arttıkça korkuda da anlamlı artışlar olabileceği söylenebilir. Diğer yandan yazılı ve birleşik uyarı gruplarının her ikisinde de korku, özyeterlik ve tepki yeterliği değişkenlerinin davranışın ortaya çıkmasında önemli etkileri olduğu söylenebilir. Diğer taraftan her iki grupta zararın şiddeti ve zarar olasılığının korku aracı değişkeni olmadan davranış üzerinde etkili olmamasının nedeni olarak, sigara içen ve sigara içmeyen öğrenciler için korkunun değişkenler arasında moderatör görevini görmesiyle ilişkilendirilebilir. Arthur ve Quester (2004)'e göre korkunun ortaya çıkması korku uyarıcıların yani zararın şiddeti ve zarar olasılığının etkisine bağlıdır ve bu değişkenler arasında aracı değişken olarak görev alır. Sigara paketlerinin üzerindeki korku uyarılarının önemli olmasına rağmen yapılan araştırmalarda gerek yazılı gerekse birleşik bu uyarıların bireyleri beklenen davranışa sevk etmediği görülmektedir. Bu çalışmada da benzer sonuçlar elde edilmiştir.

Yapılan bu çalışmada genel sonuç olarak sigara paketleri üzerindeki yazılı ve birleşik uyarıların (birleşik uyarılar daha etkili olmak üzere) bireyde sigara içmeyi önlemede etkili olabilecekleri söylenebilir.

Anahtar Kelimeler: Sigara, sigara paketi, sağlık uyarısı, davranış, korku, sağlık eğitimi



Comparison of Critical Listening Proficiency of Teacher Candidates in Terms of Several Variables

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ABSTRACT

Purpose: The research has been designed to determine the level of critical listening proficiency of the teacher candidates. It aims at finding answers to the following questions: (1) What is the level of critical listening proficiency of teacher candidates? (2) Do the teacher candidates' levels of critical listening proficiency indicate a significant difference in terms of gender, department, or university exam score variables? **Research Methods:** In this research, the relational screening model, one of the general screening models, has been utilised. Through this model, the pre-service

teachers' levels of critical listening proficiency are determined, and these levels are described separately in terms of several variables (such as gender, department, university entrance exam score type). An easily accessible sampling model has been used in sample selection. The sample of the study consists of 672 teacher candidates studying as senior students in their own. The research data were obtained by using the Critical Listening Proficiency Scale, prepared by the researchers. **Findings:** The findings indicated that the teacher candidates generally have a high level of critical listening proficiency. The teacher candidates in the departments of Turkish and Arts Teaching demonstrated much higher levels of critical listening proficiency in terms of 'attention-preparation' proficiency than the others. Furthermore, the teacher candidates with the verbal score type displayed higher levels of critical listening proficiency. **Implications for Research and Practice:** In the light of the results of this paper, the following recommendations can be given; the students studying in the departments focusing on mathematical skills should include more studies designed to improve critical listening proficiency in their undergraduate education. In pre-service trainings, many strategies and techniques should be included to improve the teacher candidates' proficiency for "Attention-Preparation" in critical listening. Considering the year the pre-service teachers are studying in, their critical listening abilities can be determined and the contributions of undergraduate education in this respect can be studied.

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Introduction

Throughout the communication process, the efficient use of listening skills is required in order to understand a person and to perceive the external environment. Various researches on the time allocated to communication per day have concluded that the language skill we use the most in daily life is listening (Bird, 1953; Burley-Allen, 1995; Hagevik, 1999; Szukala, 2001). Listening is an important field of skill not only for the time it takes within communication but also for its contribution to daily life. Affirming that the listening skill is the basis of communication, Wolvin and Coakley (2000) associates this basic skill character of listening to the fact that it is the first among learnt language skills. Listening is a process since the individual analyses what he hears, synthesises them with his current knowledge and evaluates them. Listening is also a behaviour since it is under the influence of personal traits, such as education, culture and gender. Therefore, listening has importance regarding human relations, and it is an indispensable part of the individual (Lu, 2005).

The studies reveal that a great deal of time is allocated for listening in teaching-learning environments, as well as in daily life (DeVito, 1995; Robertson, 2004; Winn, 1988). The effectiveness of listening in teaching-learning environments is highly influential on people's knowledge, attainments and social relations. Consequently, this skill, actively used in the lives of individuals, requires more attention than presently given.

The main way to achieve good communication is to be able to effectively listen to the person. In communication, effective listening is considered an "intellectual and critical process" (Barin, 1997). Accordingly, in this process, critical listening is attentively treated as an effective listening type. Effective listening requires listening with an open mind in order to understand; it is important that listening with an open mind be completed by critical listening. This is because listening with an open mind enables a better understanding of what is being told, whereas critical listening enables for better analysis and assessment. Critical listening is to determine whether everything we listen to is true (Unalan, 2001, p. 74; Yalcin, 2002, p. 134). Therefore, critical listening is a process of inquiry and comparison. Throughout the process, the listener thinks whether the words of the speaker are based on his profession, the extent of a general or subjective approach, and whether the asserted information maintains validity. Since the process comprises the sense of inquiry, comparison and acquisition of new values, the message is transmitted fast via the verbal channel. As high level thinking skills are employed in the interpretation and assessment process, the listener should be very fast with critical listening. The meanings should be analysed, and the comparative, overlapping and non-overlapping aspects of knowledge should be researched. Thus, the listener becomes able to control what he listens to (Karaduz, 2010a, p. 1585). In this process, it is essential that the listener can ask himself certain questions in order to compare and check what is being heard. For this purpose, the listener may ask questions to himself such as "Is there a connection between the assertions and conclusions of the speaker? What similarities are there between the thoughts of the speaker and my knowledge?" (Yalcin, 2002, p. 113). Through the help of such questions, the listener defines the thoughts of the sender of

the message via inquiry. From then on, the critical listener tries to assess the speaker's thoughts or messages in an objective manner (Ozbay, 2005, p. 79). In other words, having learnt the critical listening skill, the individual will certainly check the accuracy and assess what he listens to in this respect.

In view of the above-mentioned issues, the critical listening skill comprises both physical (hearing) and cognitive (attention, perception, comprehension, analysis, assessment) aspects. Therefore, critical listening is impossible when the listeners are totally passive. According to Maltepe (2016), the students must learn, and critical reading, listening, speaking, and writing methods were also included among the methods of developing language skills. As a result, various listening strategies and techniques should be used so that the listening activities in learning environments can attain a critical feature. The learning atmosphere providing the student with sense of confidence and giving value to the individual is important. Even if the teacher offers various stimulators, he/she has no direct control on students (Guclu 2016, p. 281). Independent students' work with listening comprehension is a complex dynamic process requiring good skills of: perception, division of the flow of speech and differentiation of perceptible sounds and their complexes (Shevchenko & Godunova, 2016). In teaching-learning environments, critical listening will help students to understand accurately, that is to examine their teacher by listening carefully, analysing critically and evaluating what has been told. However, very few teachers have been able to teach students how they should listen and how they can improve their listening skills. This fact is more or less the same nowadays.

The more listening skills a teacher gains in his pre-service education, the more he can get the students to learn this skill. In other words, if the teacher possesses effective listening proficiency, his students can develop it correspondingly. Therefore, pre-service teachers who have to carry out healthy communication with their students in the future should be good listeners and possess critical listening proficiency. If teacher candidates have critical listening proficiency, they will be successful in their family and social relations as well as their educational life. In the light of this view, there is a need to carry out research on determining the level of critical listening proficiency possessed by teacher candidates in pre-service trainings. This research has been considered to be significant due to the lack of similar studies in relevant literature.

The Purpose of the Study

The research has been designed to determine the level of critical listening proficiency of the teacher candidates. It aims at finding answers to the following questions:

1. What is the level of critical listening proficiency of teacher candidates?
2. Do the teacher candidates' levels of critical listening proficiency indicate a significant difference in terms of gender, department, or university exam score variables?

Method

Research Design

In this research, the relational screening model, one of the general screening models, has been utilised. This model tries to identify the degree and direction of differentiation between given variables (Karasar, 2014, p. 81). Through this model, the pre-service teachers' levels of critical listening proficiency are determined, and these levels are described separately in terms of several variables (such as gender, department, and university entrance exam score type).

Research Sample

An easily accessible sampling model has been used in sample selection. The population of research consists of students in the Faculty of Education at Firat University in the academic year 2013-2014. The sample consists of teacher candidates in their final year studying in the Primary School, Social Sciences, Science, Turkish, Computer Education and Instructional Technologies (CEIT), Mathematics, Art, and Pre-School Teaching departments.

Research Instrument and Procedure

In order to collect the research data, the researchers have prepared a draft scale of 20 items after the literature review and an examination of similar scales. After the necessary arrangements and changes were made in accordance with the opinions of the experts, the draft scale with 17 items was applied to 326 senior students studying in the departments mentioned above. As a result of the pre-application, the data have been analysed. According to analysis results, the Kaiser-Meyer-Olkin (KMO) value 0.796 and Bartlett Test ($\chi^2= 599.951$ $p<.01$) have been found significant. In the light of these findings, it was determined that a factor analysis could be used on the research data. Exploratory factor analysis showed that at the end of the Varimax rotation technique, 19 items gathered within four sub-scales. In order to accept an item in a sub-scale, a factor loading value of 0.30 and above were taken (Merenda, 1997). The loading values between the two closest factors were taken as 0.10 (Tavsancil, 2006). Based on these criteria, 5 items had to be excluded from the scale. The 17 item draft form was transformed into a new form of 12 items. Factor analysis was run again for the 12 item final form of the scale. In this case, it was determined that the scale explains 48.81% of the variance and gives three factors of which the eigenvalue is higher than 1.

The first factor itself explains 18.64% of the total variance and consists of four items, following the application of the Varimax rotation technique. This factor comprises the proficiency expressions with regard to attention and preparation elements, which have priority in critical listening, and is called "Attention-Preparation". The second factor explains 17.39% of the total variance and consists of three items. This second factor of the scale comprises the proficiency expressions with respect to analysis via inquiry, an important element of the critical listening skill. Accordingly, it is called "Inquiry-Analysis". As for the third factor, it explains 12.78% of the total variance and consists of five items. As the third factor includes

proficiency expressions with regard to assessment via judgment, another basic element in critical listening, it is named "Judgment-Assessment".

For the reliability of the scale, Cronbach's alpha was calculated by using the data relating to the items that are considered valid as a result of factor analysis and item analysis. Scale items were analysed with regard to their level of influence on scale reliability. After removing the items that remarkably increase scale reliability from the scale, the internal consistency coefficient was found to be 0.67 for the first factor, 0.52 for the second factor, 0.68 for the third factor and 0.74 for the overall scale. It is possible to affirm that the internal consistency, which is higher than 0.70 for the overall scale, is at a sufficient level (Nunnally & Bernstein, 1994) and that the low values for these coefficients in sub-scales are due to the fewness of items. The final form of the scale, as a result of aforementioned efforts, was applied on 672 teacher candidates.

Data Analysis

Total average scores and standard deviations, as well as the possible minimum, medium and maximum scores from the scale, served as criteria in determining the level of critical listening proficiency among teacher candidates. The scoring system of the scale is "1=Never, 2=Rarely, 3=Sometimes, 4=Usually, 5=Always". The lowest score regarding critical listening proficiency is 12 (12×1), the medium score is 36 (12×3), while the highest score is 60 (12×5). As the scores rise, the level of critical listening proficiency increases as well.

T-tests were used in the comparison of gender as the variable. For comparisons with the score types for entrance into departments and universities, the one-way variance analysis was applied in cases of normal distribution, and the Kruskal Wallis H (KWH) test was used when the distribution was not normal. When a meaningful difference was found after getting the results of the KWH test, the Mann Whitney U (MWU) test was implemented so as to determine the source of the difference by taking two combinations of the groups.

Results

The research firstly looks for an answer to the question, "What is the level of critical listening proficiency of teacher candidates?" Table 1 provides the average score of participants from the scale, as well as the standard deviation of distribution.

Table 1.

Teacher Candidates' Level of Critical Listening Proficiency

<i>Sub-scales</i>	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
Attention-Preparation	672	8.00	20.00	16.15	2.17
Inquiry-Analysis	672	3.00	15.00	9.59	2.05
Judgment-Assessment	672	6.00	25.00	18.81	2.85
Critical Listening General	672	29.00	60.00	44.56	5.27

An analysis of the scores in general from the critical listening proficiency scale in Table 1 shows that the lowest score is 29.00, the highest score is 60.00, while the average score is 44.56. The average score of teacher candidates in the critical listening proficiency scale is higher than the middle score (36.00). Thereupon, it is possible to assert that teacher candidates have a high level of critical listening proficiency. The statistical findings about the sub-scales of the critical listening proficiency scale show the average scores of teacher candidates to be as such: Attention-Preparation ($M=16.15$), Inquiry-Analysis ($M=9.59$) and Judgment-Assessment ($M=18.81$). These average scores in sub-scales of the scale are higher than the middle score in sub-scales. Therefore, the researchers can assert that the teacher candidates generally possess the proficiency for "Attention-Preparation", which is a prior member of critical listening, followed by analysis via inquiry as the second member and assessment via judgment as the last member. Nevertheless, the average score for the sub-scale "Inquiry-Analysis" ($M=9.59$) is strikingly close to the middle score limit ($3 \times 3 = 9.00$). The results of the t-test dependent on gender over the general scale and sub-scale scores are given in Table 2.

Table 2.

Results of t- Tests With Regard to Critical Listening Proficiency Scores of Teacher Candidates According to Gender Variable

Sub-scales	Gender	N	M	SD	t	p
Attention-Preparation	Male	309	16.07	2.17	-.906	.365
	Female	363	16.22	2.17		
Inquiry-Analysis	Male	309	9.61	2.04	.206	.837
	Female	363	9.58	2.06		
Judgment-Assessment	Male	309	18.76	2.90	-.448	.654
	Female	363	18.86	2.81		
Critical Listening GENERAL	Male	309	44.44	5.25	-.535	.593
	Female	363	44.66	5.30		

* $p < .05$

An analysis on the t-test results in Table 2 reveals that gender does not exhibit a meaningful difference in the general scale and sub-scale scores of the teacher candidates with regard to critical listening proficiency ($p > .05$). Results of the KWH test for the department variable with regard to Attention-Preparation sub-scale scores are given in Table 3.

Table 3.

KWH test results of the scores of teacher candidates from "Attention-Preparation" sub-scale according to department variable

Sub-scale	Department	N	Mean	df	KWH	p	MWU
Attention-Preparation	Primary	110	324.87	7	16.930*	.018	6-1
	Science	81	330.73	664			6-3
	CEIT	115	301.10				6-8
	Mathematics	80	329.04				7-1
	Social	96	344.07				7-2
	Turkish	103	377.42	671			7-3
	Art	35	419.54				
	Pre-School	52	308.93				
Levene:		2.731	P= .008				

* $p < .05$

Among the Attention-Preparation sub-scale scores, a significant difference is detected between the scores of groups according to the department variable [KWH(7)= 16.930, $p < .05$]. In order to find out the source of the difference, the MWU test was carried out on binary combinations of groups, whereupon the differentiation was found to take place among teacher candidates in the Turkish Teaching department and those in the departments of Primary School, CEIT and Pre-School Teaching, as well as among the teachers-to-be in the Art Teaching department and those in the departments of Primary School, Science, CEIT, Mathematics and Pre-School Teaching. These differences were found to be in favour of the students in the Turkish and Art Teaching departments. Moreover, the teacher candidates with the lowest scores for Attention-Preparation proficiency are strikingly in the CEIT department. This finding reveals that the teacher candidates in the CEIT department have lower levels of proficiency in the Attention-Preparation sub-scale of critical listening, such as "While listening, I think of what the speaker says", "I listen attentively in order to grasp the message", "I listen to the speaker in order really to understand what is told", and "I try to listen to the subject till the very end despite any psychological or physical obstacle". Nonetheless, no meaningful difference was found in the results of the variance analysis of the department variable with regard to the scores of the Critical Listening Proficiency Scale in general and among its sub-scales.

Table 4 gives the results of the variance analysis dependent on the scores of the teacher candidates from "Critical Listening Proficiency in General" and the sub-scale "Inquiry-Analysis" with the consideration of university entrance score types.

Table 4.

Results of Variance Analysis According to "Critical Listening Proficiency in General" and "Inquiry-Analysis" Sub-Scale Scores of Teacher Candidates In View of The Variable of Score Types

Sub-scale	Score type	N	M	SD	df	F	p	Scheffe
Inquiry-Analysis	Verbal	197	9.90	2.12	2	3.386*	.034	1-3
	Equally	185	9.52	1.96	669			
	Numerical	290	9.42	2.03	671			
Critical Listening GENERAL	Verbal	197	45.38	5.52	671	3.756*	.024	1-3
	Equally	185	44.45	5.27				
	Numerical	290	44.06	5.05				

* $p < .05$

As seen in Table 4, a meaningful difference is detected among the scores from critical listening proficiency in general [$F(2,669) = 3.756, p < .05$] and the Inquiry-Analysis sub-scale [$F(2,669) = 3.386, p < .05$], in terms of the university entrance exam score type variable. The Scheffe test was utilised in order to find the difference between the score types. Thereupon, the results show that there is a meaningful difference in favour of teacher candidates with verbal scores compared to those with numerical scores. Hence, the scores of teacher candidates with verbal scores are higher in critical listening in general and the sub-scale of Inquiry-Analysis than those candidates with numerical scores. In the light of these findings, it is possible to say that the teacher candidates with verbal scores have a higher degree of proficiency within critical listening in general and the Inquiry-Analysis sub-scale in particular, as seen in statements such as "I ask questions to enlarge what the speaker tells me", "I listen to the speaker as if I will grade him", and "I question my own point of view by asking questions of the speaker".

Table 5 provides results of the KWH test for the scores from "Attention-Preparation" that are dependent on the score type in university entrance exams.

Table 5.

Results of KWH Test Regarding the Scores of "Attention-Preparation" Sub-Scale of Teacher Candidates In View of the Variable of Score Types

Sub-scale	Score type	N	Mean Rank	df	KWH	p	MWU
Attention-Preparation	Verbal	197	370.81	2	8.993*	.011	1-2
	Equally	185	325.88	669			
	Numerical	290	319.97	671			
Levene:		3.475	P = .032				

* $p < .05$

Table 5 demonstrates that the scores of the teacher candidates from the Attention-Preparation sub-scale change significantly depending on their score types in the university entrance exam [KWH(2)= 8.993, $p < .05$]. The MWU test showed that among the teacher candidates with verbal (MR=370.81), equally weighted (MR=325.88), and numerical (MR=319.97) scores, those with verbal scores have an advantage.

Discussion and Conclusion

The results of the statistics revealed that the average scores from the critical listening proficiency scale in general and from its sub-scales are higher than the middle scores of the scale and sub-scales. It has been concluded that teacher candidates generally possess critical listening proficiency. Having this kind of proficiency, the teacher candidates can be thought of as critical listeners. With the scores from the sub-scales, the candidates are revealed as listeners who listen to speeches attentively, analyse them through inquiry and evaluate objectively. On the other hand, according to the paper conducted by Elias and Pihie (2003) that examines the level of listening skills between the students of the Faculty of Education and the students from different departments, it is revealed that the previous group lacks a good level of listening skills.

Critical listening is a positive and effective kind of listening in which the accuracy of the speaker is checked, the message is efficiently sent and received, and the cognitive processes, such as "perception" and "comprehension", are operated (Ozbay, 2005). Therefore, the pre-service teachers who have this listening proficiency are expected to be successful in their future careers. According to Wolvin and Coakley (1991), possessing effective listening skills has a vital role in communication in the business world because it influences success in business, general career skills, management skills, and the effectiveness and adequacy of relationships with directors and managers. In addition to this Elekaei, Faramarzi, and Tabrizi's (2016) study sought to investigate the relationship between autonomy and critical thinking ability of Iranian EFL learners, the effect of learners' autonomy level on learners' listening comprehension ability and the effect of learners' critical thinking ability on their listening comprehension ability.

The results show that there is no difference between the levels of critical listening proficiency among teacher candidates in terms of the gender variable. The paper by Yoncalik and Cimen (2006, p. 142) to determine the listening skills for interpersonal communication of students in the Physical Education and Primary School Teaching departments also point to no meaningful difference between the scores in terms of gender and concludes that both male and female students have "medium" levels of listening skill. This finding seems to support the result of this research as well.

In consideration of department for the teacher candidates, the undergraduates in the Turkish and Art Teaching departments possess a higher level of Attention-Preparation proficiency with regard to critical listening compared to those in the numerical and equally weighted departments. In a critical listening environment, the listeners pay attention to the speaker to learn what is necessary and important (Karaduz, 2010b, p. 45). Accordingly, the results of this research reveal that the

teacher candidates, particularly those in verbal based departments such as Turkish Teaching, make more preparations for listening and pay more attention to what is told.

The Review of Primary Education Program shows that the listening training for students is restricted within the curriculum of Turkish lessons. However, in consideration of the importance of listening, such training should be planned so as to include the whole time spent at school. Since language is a tool that is used in teaching anything, language skills should be placed in all teaching-learning environments. Therefore, language skills should be taught not only in the Turkish lessons but also in more general classes such as mathematics, science, social sciences, physical education, etc. in order to fully benefit from opportunities in the learning process. Thus, the students will realise the importance and necessity of listening as a skill widely used in every aspect of their lives. For this reason, not only the Turkish teachers or teacher candidates but also the other teachers and candidate groups should have sufficient knowledge and proficiency for teaching listening skills (Epcacan, 2013, p. 345).

A comparison of Attention-Preparation proficiency under critical listening and the university entrance score types of the teacher candidates demonstrates that future teachers with verbal scores have a higher level of proficiency than those with numerical and equally weighted scores. This result supports the outcome seen for the department variable. This consequence is probably a result of the fact that listening activities are comprised of verbal-based features. Critical listening includes processes like attention, inquiry and assessment. The realisation of these mental activities during the listening process depends on the situation and when the listeners are active. A critical listener is always attentive (Ozbay, 2005, p. 79). Before listening, the listener should be mentally ready, have background knowledge, create listening objectives, predict and interpret the process of listening, make distinctions and associations between his and the speaker's thoughts, create questions while listening, and use the many strategies and techniques that will enable him to prepare for determining the main theme, as well as any secondary theme (Karaduz, 2010a, p. 1586). The results of the paper indicate that the teacher candidates with numerical and equally weighted score types are insufficient with regard to such proficiency.

Moreover, teacher candidates with verbal scores have a higher level of "Inquiry-Analysis" and "Critical Listening-GENERAL" proficiency than those with numerical scores. The objective of critical listening is to ensure that the listeners gain the habit of questioning, think about the case, assess the topic in both positive and negative aspects with an objective point of view, approach the events and situations within the scope of their ethics and possibilities, and behave accordingly (Dogan, 2011, p. 35). The paper reveals that teacher candidates with verbal capacity are better at this proficiency for critical listening.

In the light of the results of this paper, the following recommendations can be given; the students studying in the departments focusing on mathematical skills should include more studies designed to improve critical listening proficiency in their

undergraduate education. In pre-service trainings, many strategies and techniques should be included to improve the teacher candidates' proficiency for "Attention-Preparation" in critical listening. Considering the year the pre-service teachers are studying in, their critical listening abilities can be determined and the contributions of undergraduate education in this respect can be studied. In addition to teacher candidates, other studies to determine the teachers' critical listening proficiency levels can be conducted. Moreover, other research studies may be carried out to determine the teachers' practices to enhance the students' critical listening proficiency.

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Öğretmen Adaylarının Eleştirel Dinleme Yeterliklerinin Çeşitli Değişkenler Açısından Karşılaştırılması

Atıf:

Kazu, H. & Demiralp, D. (2017). Comparison of critical listening proficiency of teacher candidates in terms of several variables. *Eurasian Journal of Educational Research*, 68, 81-95 <http://dx.doi.org/10.14689/ejer.2017.68.5>

Özet

Problem Durumu: İnsanın, yaşamı boyunca elde ettiği bilgilerin çoğunu dinleme yolu ile elde ettiği söylenebilir. Bu nedenledir ki dinleme, yalnızca iletişimde kapsadığı süre bakımından değil, insanın günlük yaşamına olan katkısı açısından da önemli bir beceri alanıdır. İyi bir iletişim kurmanın temel yolu, karşıdaki kişiyi etkili bir biçimde dinleyebilmektir. Etkili dinleme açık bir zihinle, anlamak için dinlemeyi gerektirmekte, açık bir zihinle dinlemenin eleştirel dinlemeyle tamamlanması önem kazanmaktadır. Dolayısıyla bu süreçte, etkili dinleme türlerinden eleştirel dinleme üzerinde önemle durulmaktadır. Eleştirel dinleme süreci bir sorgulama ve karşılaştırma sürecidir. Öğrenme-öğretme ortamında eleştirel dinleme, öğrencilerin öğretmenlerini dikkatle dinleyip, onların söylediklerini eleştirel bir şekilde analiz edip, değerlendirmelerini sağlayarak anlatılanları doğru anlamalarına ve irdelemelerine yardımcı olacaktır. Öğretmenin öğrencilerine dinleme becerisini kazandırabilmesi onun hizmet öncesi eğitiminde dinleme becerilerine verilen yer ve önemle ilişkilidir. Ayrıca öğretmenlerin dinleme becerisini kazandırabilmeleri, etkili dinleme yeterliklerine sahip olmaları ile de paralellik gösterir. Dolayısıyla, ileride öğrencileriyle sağlıklı iletişimi gerçekleştirmek durumunda olan öğretmen adaylarının da iyi bir dinleyici olması ve etkili dinleme türlerinden eleştirel dinleme yeterliklerine sahip olması gerekmektedir. Öğretmen adayları eleştirel dinleme yeterliklerine sahip oldukları ölçüde, bunu okuldaki öğrenme-öğretme süreçlerinde, kendi aile yaşamlarında ve tüm insanlarla olan ilişkilerinde uygulayabileceklerdir. Bu düşüncelerden yola çıkılarak, öğretmen adaylarının hizmet öncesi eğitimlerinde eleştirel dinleme yeterliklerine sahip olma düzeylerinin belirlenmesi yönünde bir araştırmanın yapılmasına gereksinim duyulmuştur. Bu konuya yönelik literatürde herhangi bir araştırmanın yapılmamış olması açısından çalışmanın önem arz ettiği düşünülmektedir.

Araştırmanın Amacı: Araştırma, öğretmen adaylarının eleştirel dinleme yeterliklerine sahip olma düzeylerinin belirlenmesi gereksinimiyle desenlenmiştir. Bu amaçla şu sorulara cevap aranmıştır: (1) Öğretmen adaylarının eleştirel dinleme yeterliklerine sahip olma düzeyleri nedir? (2) Öğretmen adaylarının eleştirel dinleme yeterliklerine sahip olma düzeyleri, onların cinsiyetlerine, bölümlerine ve üniversiteye giriş puan türlerine göre anlamlı bir farklılık göstermekte midir?

Araştırmanın Yöntemi: Araştırmada, genel tarama modellerinden karşılaştırma türü ilişkisel tarama modelinden yararlanılmıştır. Araştırmada öğretmen adaylarının eleştirel dinleme yeterliklerine sahip olma düzeyleri belirlenmiş ve bu yeterliklere sahip olma düzeyleri çeşitli değişkenler (cinsiyet, bölüm ve üniversiteye giriş puan türü) açısından ayrı ayrı betimlenmiştir. Çalışmanın örneklemini, 2013-2014 eğitim-öğretim yılında Fırat Üniversitesi Eğitim Fakültesi'nin Sınıf, Sosyal Bilgiler, Fen Bilgisi, Türkçe, Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE), Matematik, Resim-iş ve Okul Öncesi Öğretmenlikleri bölümlerinin dördüncü sınıflarında öğrenim gören 672 öğretmen adayı oluşturmaktadır. Araştırmanın verileri, araştırmacılar tarafından hazırlanan ve geçerlik-güvenirlik çalışmaları yapılan Eleştirel Dinleme Yeterlikleri Ölçeği ile elde edilmiştir. Ölçek 12 madde ve üç boyuttan (Dikkat-Hazırlık, Sorgulama-Analiz Etme, Yargılama-Değerlendirme) oluşmaktadır. Öğretmen adaylarının eleştirel dinleme yeterliklerine sahip olma düzeylerinin belirlenmesinde toplam ortalama puanlar ve standart sapmalar ile ölçekten alınabilecek minimum, orta ve maksimum puanlar ölçüt olarak alınmıştır. Ölçekten alınan puanlar arttıkça eleştirel dinleme yeterliklerine sahip olma düzeyi artmaktadır. Verilerin analizinde betimsel istatistikler, t testi, varyans analizi, Kruskal Wallis H ve Mann Whitney U testlerinden yararlanılmıştır.

Araştırmanın Bulguları: Araştırma bulguları, öğretmen adaylarının genel olarak eleştirel dinleme yeterliklerine sahip olma düzeylerinin yüksek olduğunu göstermiştir. Öğretmen adaylarının eleştirel dinleme becerisinde önemle öncelikli olan dikkat-hazırlık ögesine, ikinci aşama olan sorgulayarak analiz etmeye ve de son unsuru oluşturan yargılayarak değerlendirmeye ilişkin yeterliklere genel olarak sahip oldukları belirlenmiştir. Bununla birlikte araştırmada; öğretmen adaylarının eleştirel dinleme yeterliklerine sahip olma düzeylerinin cinsiyet değişkenine göre farklılaşmadığı görülürken, öğretmen adaylarının öğrenim gördükleri bölümleri dikkate alındığında ise, Türkçe ve Resim-iş Öğretmenliği bölümlerinde öğrenim gören öğretmen adaylarının sayısal ve eşit ağırlıklı bölümlerdekilere göre eleştirel dinlemenin dikkat-hazırlık yeterliklerine sahip olma düzeylerinin daha yüksek olduğu sonucu ortaya çıkmıştır. Ayrıca öğretmen adaylarının üniversiteye giriş puan türlerine göre karşılaştırıldığında, sözel puan türüne sahip olan öğretmen adaylarının eleştirel dinleme yeterliklerine daha fazla sahip oldukları belirlenmiştir.

Araştırmanın Sonuçları ve Önerileri: Araştırmada öğretmen adaylarının genel olarak eleştirel dinleme yeterliklerine sahip oldukları sonucuna ulaşılmıştır. Bu yeterliklere sahip olmaları, onların eleştirel birer dinleyici olduklarını, alt boyutlarıyla da; konuşmaları dikkatli bir şekilde dinleyen, sorgulayarak analiz eden ve objektif olarak değerlendirebilen kişiler olduklarını gösterebilir. Öğretmen adaylarının bu dinleme yeterliklerine sahip olmaları, gelecekte yapacakları öğretmenlik mesleğindeki kariyerlerini de olumlu etkileyecektir. Araştırmanın sonuçları, özellikle Türkçe Öğretmenliği gibi sözel ağırlıklı bölümlerde öğrenim gören öğretmen adaylarının dinleme için daha fazla hazırlık yaptıklarını ve konuşulanlara daha fazla dikkat ettiklerini göstermiştir. Bununla birlikte, sayısal ve eşit ağırlık puan türlerine sahip öğretmen adaylarının eleştirel dinlemenin dikkat-hazırlık yeterliklerine sahip olma noktasında yetersiz kaldıkları sonucuna da ulaşılmıştır. Ayrıca araştırma, sözel

yetkinlikteki öğretmen adaylarının eleştirel dinlemenin sorgulama-analiz etme yeterliklerine daha fazla sahip oldukları sonucunu ortaya çıkarmıştır. Bu sonuçlar doğrultusunda şu öneriler geliştirilebilir: Sayısal ağırlıklı bölümlerde öğrenim gören öğretmen adaylarının eleştirel dinleme yeterliklerine sahip olma düzeylerini artırıcı dinleme stratejileri geliştirilmelidir. Öğretmen adaylarında eleştirel dinlemenin dikkat-hazırlık yeterliklerini geliştirecek birçok strateji ve tekniğe hizmet öncesi eğitimlerinde yer verilmelidir. Öğretmen adaylarının öğrenim gördükleri sınıf düzeyleri dikkate alınarak, eleştirel dinleme yeterliklerine sahip olma düzeyleri belirlenebilir ve bu doğrultuda lisans eğitiminin katkısına ilişkin saptamalar yapılabilir. Öğretmen adaylarının yanı sıra öğretmenlerin de eleştirel dinleme yeterliklerine sahip olma düzeylerine ve öğrencilerinde bu yeterlikleri geliştirmeye yönelik uygulamalarının belirlenmesine ilişkin araştırmalara yer verilebilir.

Anahtar kelimeler: İletişim, Dinleme becerileri, Etkili dinleme, Eleştirel dinleme, Öğretmen eğitimi



Forgiveness of Others and Self-Forgiveness: The Predictive Role of Cognitive Distortions, Empathy, and Rumination*

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ABSTRACT

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Keywords

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Purpose: People encounter many hurtful experiences in daily life. Hurtful experiences lead to negative emotions such as anger, revenge, shame, and guilt, and people need to overcome these experiences effectively in order to protect their mental health. Unforgiveness proves to be one of the most important sources of stress in an individual's life, and forgiveness, on the other hand, is acknowledged as an effective coping mechanism that can be utilised in coping with this stressful mood. The purpose of this study was to investigate the predictive role of interpersonal cognitive distortions, empathy, and rumination on levels of self-forgiveness and forgiveness of others. **Research Methods:** The study was carried out with 527 university students. The Heartland Forgiveness Scale, Interpersonal Reactivity Index, short form of Rumination Scale, Interpersonal Cognitive Distortions Scale, and Personal Information Form were used in order to collect data for the study. Stepwise Multiple Regression Analysis was used to analyze the data. **Findings:** The results showed

that where forgiveness of others was taken as a dependent variable in the regression model, cognitive distortions for interpersonal rejection, perspective taking, and empathic concern were significant predictors of forgiveness of others. Furthermore, in the model where self-forgiveness was chosen as a dependent variable, rumination and personal distress were found to be significant predictors of self-forgiveness. **Implications for Research and Practice:** Based on the results, during the forgiveness-based counseling interventions or psychoeducational programs, it can be more effective that practitioners consider related features or create modules based on these psychological constructs.

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Introduction

Influenced by positive psychology, there has been a recent increase in studies on how to utilize positive resources such as positive emotions or character strengths of individuals during the counseling processes (Rashid, 2015; Seligman & Csikszentmihalyi, 2000). Forgiveness is a significant psychological structure which has been studied for about the last thirty years (Enright et al., 1991; Thompson et al., 2005; Worthington, 2013). According to Worthington and Scherer (2004), unforgiveness proves to be one of the most important sources of stress in an individual's life. *Forgiveness*, on the other hand, is acknowledged as an effective coping mechanism that can be utilized in coping with the stress caused by unforgiveness (Berry et al., 2005; Worthington & Scherer, 2004).

It is remarkable that researchers attempting to define forgiveness of others have not yet reached a full consensus on whether forgiveness was a moral gift presented to the offender (Enright et al., 1991), a cognitive decision (DiBlasio, 2000), or an internal motivational transformation happening in the offended individual (McCullough et al., 1998). Although there are some differences, forgiveness of others has been regarded as cognitive, affective, motivational, behavioral, intraindividual, interpersonal, prosocial changes in attitude from negative to positive toward a perceived transgression (McCullough, Pargament & Thoresen, 2000; Worthington, 2005).

Psychology researchers started to explore forgiveness, especially after the 1990s, as a multidimensional structure. According to scholars (Hepp-Daxx, 1996; Thompson et al., 2005), one of the most significant dimensions of forgiveness is self-forgiveness. During the process of self-forgiveness, an individual thinks that he or she violated some important personal, social, and/or moral standard because of an offense he or she did. These thoughts bring about feelings of guilt and shame (Tangney, Boone & Dearing, 2005) and therefore give way to self-resentment, self-criticism, and even self-humiliation (Hall & Fincham, 2005; Holmgren, 1998). Individuals, however, let these negative emotions end by choosing self-forgiveness consciously and go through an important transformation by acting upon a more benevolent motive towards themselves (Hall & Fincham, 2005).

There are many studies in the literature that have demonstrated that forgiveness of others and self-forgiveness are indeed positively supportive of the physical and psychological health of individuals. Study findings show that as people's levels of forgiveness of others increase, their anger (Waltman et al., 2009), depression (Friedberg, Suchday & Sirinivas, 2009), and stress (Suchday, Freidberg & Almeida, 2006) levels decrease and their physical (Lawler-Row et al., 2008) and psychological health conditions (Ysseldyk, Matheson & Anisman, 2007) improve. Similarly, it was found that when an individual was able to have self-forgiveness following an offense, it gave way to a decrease in depressive symptoms (Maltby, Macaskill & Day, 2001) and feelings of shame (Rangganadhan & Todorov, 2010) while it helped improve that person's life satisfaction (Thompson et al., 2005).

Studies on forgiveness have begun to find a place in the field of counseling since the mid-2000s in Turkey, and these studies have focused more on forgiveness of others. The results of these studies have revealed that forgiveness had statistically significant relationships with marital adjustment, attributions (Taysi, 2007), jealousy, empathy, self-esteem (Alpay, 2009), attachment styles (Yildirim, 2009), religiosity (Ayten, 2009), mental health (Akin, Ozdevecioglu & Unlu, 2012), meaning in life, subjective well-being (Yalcin & Malkoc, 2015), and self actualization (Sari, 2014).

Empathy and Forgiveness

Almost all of the models defining forgiveness of others stated that having a high level of empathy makes forgiveness easier, while a lower level makes it harder (Macaskill, Maltby & Day, 2002). For instance, the model of social-cognitive determinants of forgiveness stresses that empathy is one of the most significant socio-cognitive determinants affecting forgiveness in interpersonal relationships (McCullough et al. 1998). Similarly, within the framework of the process model of forgiveness (Enright et al., 1996; Enright & Fitzgibbons, 2000) and also the pyramid model of Worthington (1998), the necessity to have empathy by an offender is underlined. The relationships between sub-dimensions of empathy and forgiveness of others have been demonstrated by a great number of correlational studies (Mellor, Fung & Mamat, 2012). For example, the results of a study by Konstam, Chernoff, and Deveney (2001) indicated that forgiveness was positively related to perspective taking and empathic concern sub-scales of empathy among college students. Similarly, Alpay (2009) stated that empathy was a positive significant predictor of forgiveness of others among married individuals in Turkey.

In spite of that, various arguments have been put forward in the literature about the relationship between self-forgiveness and empathy (Enright et al., 1996; Hall & Fincham, 2005; Tagney, Boone & Dearing, 2005). There is only a limited number of studies exploring the relationship between empathy and self-forgiveness in related literature and the findings of these studies are inconsistent. The results of a study by Turnage et al. (2012) conducted with 86 college students have revealed that there is no significant relationship between self-forgiveness and empathy. However, the findings of another study (Hodgson & Wertheim, 2007), which handled empathy from a multidimensional perspective, demonstrated that the other sub-scales of empathy showed no relationship, whereas individuals with lower personal distress levels had a higher tendency to forgive themselves.

Especially in Western culture, empathy has been used as a core tool of forgiving the offender in the counseling process. On the other hand, cultural differences have been highlighted by numerous studies (Mellor, Fung & Mamat, 2012). Therefore, more studies are needed to reach clarity about the role of empathy for forgiveness interventions in collectivist cultures. In particular, while practitioners are helping to make the self-forgiveness process of clients easier (Worthington, 2013), there is no distinct consensus in the related literature about whether sub-dimensions of empathy contribute this or not.

Rumination and Forgiveness

Since an individual's constant engagement with images, thoughts, and feelings related to hurtful experiences lead to the continuation of anger and revenge and the inability to forgive the other affectively (Berry et al., 2005; Worthington, 2006), counselors who conduct interventions based on forgiveness attach especial importance to reducing the cycle of ruminative thinking (Goldman & Wade, 2012; Loudon-Gerber, 2008). Further, there are studies in the related literature demonstrating the relationships between forgiveness of others and rumination. For instance, the results of a study by Berry et al. (2005) revealed a negative relationship between forgiveness of others and rumination. Similar to the results of that study, Suchday, Friedberg, and Almeida (2006) found that the increased levels of rumination by college students was a significant predictor of low scores for forgiveness of others.

Rumination, according to Ingersoll-Dayton and Krause (2005), is a process that can not only make it harder for an individual to forgive others, but also can prevent self-forgiveness. Rumination is considered to be an effective factor in the continuation of negative feelings and thoughts towards one's self regarding a transgression that he or she has done (Luskin, 2002). Similar to the arguments already presented, the study by Barber, Maltby, and Macaskill (2005) showed that individuals' engagement with ruminative thoughts about anger and related memories made it harder for individuals to forgive themselves. Similarly, in a study by Bugay (2010) conducted with college students in Turkey, there was a negative relationship between rumination and self-forgiveness.

Although many studies in the related literature have revealed relationships between forgiveness and rumination, practitioners need clearer findings in order to decide whether they should tackle rumination as a personality trait or not in the counseling process. While some of the studies (Karremans & Smith, 2010; McCullough, Bono & Root, 2007) note the importance of the relationship between forgiveness and state rumination, there are, on the other hand, some findings (Ysseldyk, Matheson & Anisman, 2007) that reveal connections within the contexts of trait rumination.

Cognitive Distortions and Forgiveness

Studies in the literature frequently stress that individuals not only go through affective, behavioral, and motivational transformations, but they also experience cognitive transformations during the process of forgiveness (DiBlasio, 2000; Enright, Freedman & Rique, 1998; McCullough et al., 1998). In forgiveness-based individual and group counseling interventions, the healing process begins with a conscious cognitive decision to forgive (Davis et al., 2015; Enright & Fitzgibbons, 2000). Most researchers and practitioners emphasize that cognitive transformation has to be experienced by offended people at an early period of the forgiveness process in order to replace negative emotions with positive or neutral ones (Cioni, 2007; Enright & Fitzgibbons, 2000). The essential thing for reaching emotional forgiveness is to

reframe injured people's perceptions and thoughts about their hurtful experience, injurer, or themselves (Cioni, 2007; Thompson et al., 2005).

Miceli and Castelfranchi (2011), who explored forgiveness within a cognitive and motivational context, underlined that an individual needs to reconstruct or reframe his or her cognitive schemas about agonizing hurtful experiences in order to forgive. Similarly, according to Gordon, Baucom, and Snyder (2000), who have studied forgiveness from a cognitive approach, people need to explore the core beliefs and cognitive distortions of themselves to comprehend forgiveness. As people have some fundamental assumptions about how their worlds and interpersonal relationships should be, they expect both themselves and others to act in accordance with their principles. These assumptions of individuals, however, may be violated in experiences where being hurt and hurting of others took place (Thompson et al., 2005). Thus, this situation can drag them into a cognitive and psychological complex.

Further, some recent studies (Bono & McCullough, 2006; Gordon, Baucom & Snyder, 2000; Miceli & Castelfranchi, 2011) have handled forgiveness within the context of cognitive processes. For instance, as a matter of fact, some specialists offering psychological services, such as Menahem and Love (2013), regard forgiveness as an important tool that can be utilized in cognitive therapy in certain problematic situations by drawing attention to the relationships between cognitive therapy and the process of forgiveness. Besides, in some of the psychoeducational programs organized for developing forgiveness skills (Bugay & Demir, 2012; Goldman, 2010; Navidian & Bahari, 2013), extra time is also allocated to sessions for participants in order to make participants aware of their automatic thoughts or cognitive distortions.

According to Beck (1995), people develop some core beliefs or assumptions, which are generally never questioned and regarded to be unchangeable, about other people and the world that they live in. Safran and Segal (2004), who emphasize the importance of interpersonal relationships in cognitive therapy, extended the content of core beliefs. According to Safran and Segal (2004), people develop *interpersonal schemas*, which are cognitive representations of interpersonal experiences, by observing their experiences, especially with people who happen to be their first attachment figures dating from early ages. Based on these findings, Hamamci and Buyukozturk (2003) have stated that people might also have distortions that they can generalize to all their interpersonal relationships. These authors (2003) have also underlined that in the collectivist Turkish society, people might have three types of cognitive distortions related to their relationships. These include interpersonal rejections (avoidance of closeness), unrealistic relationship expectations, and interpersonal misperceptions. Interpersonal rejections represent distorted views of individuals where it is believed that becoming close to others would bring about negative consequences and that therefore they should not form intimate relationships with others. Unrealistic relationship expectations refer to high expectations and standards, especially the behaviors of others in their relationships. Cognitive distortions about interpersonal misperceptions signify unrealistic presumptions of another's feelings and thoughts in interpersonal relationships.

Forgiveness has both intrapersonal and interpersonal dimensions (McCullough, Pargament & Thoresen, 2000). While people are forgiving, they experience inner changes. But at the same time this process occurs in an interpersonal context (Worthington, 2005). In this case, dysfunctional and overly generalized beliefs of individuals about the nature of interpersonal relationships—like “being too intimate with people generally causes problems” and “people do not keep their promises”—can prevent them from making a strong decision to forgive. The first and cognitive step toward forgiveness might be challenged by cognitive distortions about the interpersonal relationships of the injured. Thus, reaching emotional forgiveness can be harder because contrary to what is believed, one of the primary resources of unforgiveness might be these distortional beliefs rather than lack of empathy or intense ruminative thoughts. In order to utilize forgiveness as an effective tool in counseling interventions, practitioners might primarily determine these possible beliefs and reevaluate and reframe them with their clients. Although one frequently comes across traces of the cognitive model in proposed models on the forgiveness of others and self-forgiveness, there are quite a few studies that explore whether or not forgiveness is related to the fundamental concepts of the cognitive model. Therefore, this study aims at investigating whether forgiveness of others and self-forgiveness can be predicted at a statistically significant level by empathy, rumination, and cognitive distortions about interpersonal relationships. Based on this aim, the main research questions of the present study were determined as follows:

- a. Do empathy, rumination, and cognitive distortions about interpersonal relationships significantly predict forgiveness of others?
- b. Do empathy, rumination, and cognitive distortions about interpersonal relationships significantly predict self-forgiveness?

Method

Research Design

A descriptive model based on correlational design was used in this study. The dependent variables of this study were forgiveness of others and self-forgiveness, and the predictor variables of the study were sub-dimensions of interpersonal cognitive distortions and sub-dimensions of empathy and rumination.

Research Sample

The study covered a total of 527 (271 females, 256 males) undergraduate students enrolled in various universities in Turkey. The ages of the students ranged between 18 and 33, and their mean age was $\bar{X} = 21.44$ (SD= 2.05). One hundred and sixty three (30.9%) of the participants attended Ankara University, 189 (35.9%) attended Dicle University, and 175 (33.2%) attended Middle East Technical University. When the distribution of the participants according to which class they were in was studied, it was seen that 36 (6.8%) were in the preparatory class, 140 (26.6%) were

freshmen, 134 (25.4%) were sophomores, 106 (20.1%) were juniors, and 111 (21.1%) were seniors.

Research Instruments and Procedures

The Heartland Forgiveness Scale (HFS). This scale, which is composed of 18 items with a 7-point Likert-type scale, was developed by Thompson et al. (2005) in order to measure individuals' levels of forgiveness. The scale has three sub-scales called self-forgiveness, forgiveness of others, and forgiveness of situations, and each sub-scale has six items. The psychometric features of the scale point out that the Cronbach's α internal consistency coefficients were .86 for the total score and .75, .78, and .79 for the sub-scales respectively. The scale's adaptation study for Turkey was done by Bugay and Demir (2010). It was found that the Cronbach's α coefficients measured for the reliability of the scale in its Turkish form were found to be .81 for the total score, while they were .64, .79, and .76 for the sub-scales respectively. The scale's Cronbach's α coefficients for this study were measured as .72 for the total score, .71 for the forgiveness of others sub-scale, and .61 for the self-forgiveness sub-scale.

Interpersonal Reactivity Index (IRI). The form was developed by Davis (1980) in order to assess both the cognitive and affective dimensions of empathy together. The scale has 28 items on a 5-point Likert scale. The IRI has four sub-scales referred to as "perspective taking," "empathic concern," "personal distress," and "fantasy." The Cronbach's α coefficients of the scale were measured separately for each gender and it was seen that the coefficients varied between .71 and .77 for its sub-scales. The IRI was adapted to Turkish by Engeler and Yargic (2007). The Cronbach's α coefficients of sub-scales were calculated within the framework of reliability studies. Coefficient values were found to be .73 for the perspective taking sub-scale, .66 for the empathic concern sub-scale, .76 for the fantasy sub-scale, and .60 for the personal distress sub-scale. In this study, Cronbach's α coefficients of IRI were calculated to be .79 for the total score and .64, .71, and .65 for the sub-scales respectively.

Short form of Ruminative Responses Scale (SRRS). This scale was devised by Treynor et al. (2003) by removing 12 items that resembled the items related to depressive symptoms found in the longer form of the Ruminative Response Scale. The RRS is composed of ten items on a 4-point Likert scale. It has two sub-scales referred to as "brooding" and "reflection," and each sub-scale is composed of five items. The scale was adapted to Turkish by Erdur-Baker and Bugay (2012). Reliability analysis results of the scale revealed that the Cronbach's α coefficient was .85 for the whole scale, .77 for the reflection sub-scale, and .75 for the brooding sub-scale. The Cronbach's α coefficient of the SRRS for this study was calculated to be .83 for the total score.

The Interpersonal Cognitive Distortions Scale. This scale was developed by Hamamci and Buyukozturk (2003). The 19-item scale uses a 5-point Likert scale. The results of the Principal Components Analysis revealed that the ICDS has a three-factor structure referred to as "interpersonal rejection," "unrealistic relationship expectation," and "interpersonal misperception." The sub-scales of interpersonal rejection and unrealistic relationship expectation are composed of eight items, whereas the sub-scale of interpersonal misperception has three items. The reliability

analyses of the scale showed that the Cronbach's α coefficients were .67 for the whole scale and .73, .66, and .49 for the interpersonal rejection, unrealistic relationship expectation, and interpersonal misperception sub-scales respectively. In this study, Cronbach's α coefficients of the ICDS were calculated to be .75 for the total score and .71, .76, and .67 for the sub-scales respectively.

Data Analysis

Before performing the analyses, data were prepared and whether the assumptions of the multiple regression analysis were met or not was investigated. All univariate and multivariate outliers within the variables were deleted from the data set. The tolerance values, variance inflated factors, and condition indices were calculated separately for each regression model in order to evaluate whether there was a multicollinearity problem between predictor variables, and it was seen that the tolerance values were higher than .81, the variance inflation factor was lower than 1.23, and the highest value for condition indices was 15.19. The Durbin-Watson coefficient was found to be 1.87 for the model with self-forgiveness as the dependent variable, whereas it was 2.02 for the model with forgiveness of others as the dependent variable. Then, two separate stepwise regression analysis were conducted to find out the predictive values of empathy, rumination, and cognitive distortions on the forgiveness of others and self-forgiveness.

Results

Descriptive Statistics

The Pearson correlation coefficients among the variables covered by the study and also the means and standard deviations are shown in Table 1.

Table 1.
Means, Standard Deviations and Pearson Correlation Coefficients Among Study Variables

Variables	\bar{X}	Sd	1	2	3	4	5	6	7	8	9	10
1. Forgiveness of Others	24.85	6.76	-									
2. Self Forgiveness	27.58	5.06	.09*	-								
3. Interpersonal Rejections	19.69	5.19	-.20**	-.09*	-							
4. Unrealistic Relationship Expect.	23.39	5.65	-.02	-.13**	.021***	-						
5. Interpersonal Misperception	9.77	2.49	-.04	-.02	.25**	.25***	-					
6. Rumination	23.08	5.37	-.05	-.22***	.25***	.25***	.12**	-				
7. Perspective Taking	17.67	4.44	.19**	.03	-.15***	.04	.15***	.06	-			
8. Empathic Concern	19.60	4.70	.17**	-.09*	-.06	.12**	.10*	.19***	.41***	-		
9. Fantasy	16.77	5.29	.03	-.03	-.02	.08*	.12**	.10*	.15**	.28***	-	
10. Personal Distress	13.32	4.79	.03	-.23***	.14***	.22***	-.01	.26***	.05	.33***	.20***	-

*** p < .001, ** p < .01, * p < .05

Regression Analysis Results of the Predictions for the Scores of Forgiveness of Others

Table 2 shows the stepwise multiple regression analysis results that were obtained in order to determine the prediction levels of interpersonal cognitive distortions, empathy, and rumination on forgiveness of others.

Table 2.

Results of Stepwise Regression Analysis for Variables Predicting Forgiveness of Others

Model	Predictor	B	SE _B	β	t	R	R ²	ΔR^2	F
1	Constant	29.99	1.13		26.36***				
	Interp.	-.255	.056	-.196	-4.59***	.196	.039	.039	21.047***
	Rejection								
2	Constant	24.80	1.73		14.38***				
	Interp.	-.224	.056	-.172	-4.02***				
	Rejection	-.252	.065	.165	3.86***	.255	.065	.027	18.269***
	Perspective Tak.								
3	Constant	22.98	1.89		12.17***				
	Interp.	-.224	.055	-.172	-4.04***				
	Rejection	.184	.071	.121	2.59**				
	Perspective Tak.	.154	.066	.107	2.32*	.273	.075	.010	14.077***
	Empathic Con.								

*** p < .001, ** p < .01, * p < .05

Since unrealistic relationship expectation (p= .65), interpersonal misperception (p=.75), rumination (p= .51), fantasy (p= .57), and personal distress (p= .18) did not significantly predict forgiveness of others (p> .05), these variables were not included in the stepwise regression analysis. As shown in Table 2, only interpersonal rejection, perspective taking, and empathic concern significantly predicted the forgiveness of others.

The analysis was completed in three steps. *Interpersonal rejection*, which is one of the sub-scales of interpersonal cognitive distortions, was included in the first step of the analysis. It was seen that interpersonal rejection significantly predicted forgiveness of others (p= .000), and it explained about 4% of the variance in forgiveness of others on its own (R= .196, R² = .039, F_(1, 525) = 21.047).

Perspective taking, which is one of the sub-scales of empathy, was analyzed within the scope of the second step. Perspective taking explained about 7% of the total variance in forgiveness of others together with interpersonal rejection (R= .255, R² = .065, F_(2, 524) = 18.269, p = .000). The change in the squares of regression coefficients (ΔR^2) demonstrated that the perspective taking variable made a 2.7% contribution to the total variance (F_(1, 524) = 14.933, p = .000).

Empathic concern was added to the third and final step of stepwise regression analysis. According to the analysis results, interpersonal rejection, perspective taking, and empathic concern were statistically significant predictors of forgiveness of others, and these three variables together explained about 8% of the total variance in forgiveness of others ($R = .273$, $R^2 = .075$, $F_{(3, 523)} = 14.077$, $p = .000$). It was seen that empathic concern made a 1% contribution to the total variance ($\Delta R^2 = .010$, $F_{(1, 523)} = 5.387$, $p < .05$). The ranking of predictor variables in order of relative significance on forgiveness of others is as follows: interpersonal rejection ($\beta = -.172$), perspective taking ($\beta = .121$), and empathic concern ($\beta = .107$).

Regression Analysis Results of the Predictions for the Scores of Self-Forgiveness

Table 3 demonstrates the stepwise multiple regression analysis results that were obtained in order to determine the prediction levels of interpersonal cognitive distortions, empathy, and rumination on self-forgiveness.

Table 3.

Results of Stepwise Regression Analysis for Variables Predicting Self-forgiveness

Model	Predictor	B	SE _B	β	t	R	R ²	ΔR^2	F
1	Constant	30.744	.636		48.31***				
	Personal Dist.	-.238	.045	-.225	-5.29***	.225	.051	.051	27.965***
2	Constant	33.932	1.01		33.71***				
	Personal Dist.	-.190	.046	-.180	-4.15***				
	Rumination	-.165	.041	-.176	-4.05***	.282	.079	.029	22.589***

*** $p < .001$

Since interpersonal rejection ($p = .17$), unrealistic relationship expectation ($p = .06$), interpersonal misperception ($p = .62$), perspective taking ($p = .29$), empathic concern ($p = .71$), and fantasy ($p = .37$) did not significantly predict self-forgiveness, these variables were not included in the stepwise regression analysis ($p > .05$). As is shown in Table 3, only personal distress and rumination were processed within the stepwise regression analysis.

The regression analysis was completed in two steps. *Personal distress*, which is one of the sub-scales of empathy, was analyzed in the first step. It was seen that personal distress was a significant predictor of self-forgiveness and explained about 5% of the variance in self-forgiveness on its own ($R = .225$, $R^2 = .051$, $F_{(1, 525)} = 27.965$).

Rumination was added to the process in the second and final step. According to the analysis results, personal distress and rumination were significant predictors of self-forgiveness. These two variables together explained about 8% of the total variance in self-forgiveness ($R = .282$, $R^2 = .079$, $F_{(2, 524)} = 22.589$, $p = .000$). It was also seen that rumination contributed to the total variance at 3% ($\Delta R^2 = .029$, $F_{(1, 524)} =$

16.393, $p = .000$). The relative significance ranking of the predictor variables on self-forgiveness was found to be personal distress ($\beta = -.180$) followed by rumination ($\beta = -.176$).

Discussion and Conclusion

This study investigates the predictive role of interpersonal cognitive distortions, empathy, and rumination on forgiveness of others and self-forgiveness. The findings are discussed according to the dependent variables used in the study.

Discussion of Findings Related to the Prediction of Forgiveness of Others

The findings of the study revealed that forgiveness of others was negatively predicted by cognitive distortions related to interpersonal rejection in order of significance, whereas it was positively predicted by empathy's sub-scales, perspective taking, and empathic concern.

Although traces of the cognitive model are frequently seen in the proposed models in the process of forgiveness (Gordon, Baucom & Snyder, 2000; Miceli & Castelfranchi, 2011), limited studies were found that investigated the relationship between individuals' possible cognitive distortions as related to their interpersonal relations and forgiveness of others. It is, however, seen that the arguments put forward in the social-cognitive model on forgiveness of others support this finding of the study. This model emphasizes that an individual's having an affective and physical avoidance motive towards an injurer is one of the most significant signs that the other could not be forgiven (McCullough et al., 1998). Also, this finding confirms theoretical explanations of some of the proposed models (Gordon, Baucom & Snyder, 2000) and intervention studies of forgiveness (Bugay & Demir, 2012; Goldman, 2010; Navidian & Bahari, 2013). Individuals with cognitive distortions related to interpersonal rejection have a core belief that forming intimate relationships with others would bring about negative consequences for themselves (Hamamci & Buyukozturk, 2003). When this situation is taken into consideration, one can state that the distorted beliefs of these people will be activated in a much more rapid and automatic manner against any hurtful experience. These dysfunctional beliefs will be confirmed by new injuring situations. In these circumstances, empathizing with the offender or reducing rumination will be more difficult unless the dysfunctional expectations have been reframed. Therefore, consistent with the finding of this study that interpersonal rejection is a stronger predictor than empathy and rumination, dwelling primarily on cognitive distortions in the counseling process may be more effective for forgiving the offender.

The results of the study revealed that perspective taking and empathic concern are significant predictors of forgiveness of others. When the existing studies exploring empathy and forgiveness of others are investigated together, it is seen that they were generally conducted with a differentiation set between cognitive and affective empathy. The results of other studies on the same subject are compatible with this study's finding that perspective taking positively predicted forgiveness

(Brown, 2003; Hodgson & Wertheim, 2007; Zechmeister & Romero, 2002). An individual focusing on the harmful consequences of a situation of injury for him- or herself will constantly feed his or her negative feelings, like anger, towards the other person. Thus, the cycle of inability to forgive will maintain its function in the individual's life. However, one needs to change the context in which the situation was evaluated (Enright et al., 1996; Enright & Fitzgibbons, 2000) and to re-interpret his or her perceptions related to the hurtful experience or the injurer in order to be able to forgive the injurer (Thompson et al., 2005).

The results of this study also signify that empathic concern, which was defined as a type of other-oriented affective empathy, was a positive significant predictor of forgiveness of others. There are existing studies that support this finding (Burnette et al., 2009; Konstam, Holmes & Levine, 2003; Zechmeister & Romero, 2002). Related studies have found that participants' levels of forgiveness of others increased as their affective empathy or empathic concern levels increased. As was stated by Malcolm, Warwar, and Greenberg (2005), although perspective taking is necessary to understand the injurer and to re-evaluate the hurtful experience that the individual is in within a wider context, it does not bring about friendly or generous feelings for the person forgiven. For the person to have a transformation in his or her negative feelings for the injurer, he or she needs to have affective empathy with the other as well.

The results of the study also revealed that rumination did not make a significant contribution to the prediction of forgiving others. A large portion of the studies on forgiveness of others presented in the literature concluded that individuals had a harder time forgiving injurers as their rumination levels increased (Berry et al., 2005; Burnette et al., 2007; Karremens & Smith, 2010). In this situation, the finding of this study stating that rumination did not significantly predict forgiveness of others is thought-provoking. However, many psychological constructs such as anger, anxiety, forgiveness, and rumination have two separate dimensions called *state* and *trait*. Individuals' levels of anger, forgiveness, or rumination towards a specific situation may not always be parallel to their general levels of these traits. Therefore, it is possible to have a psychological construct being related to the state dimension of another variable that is not related to its trait dimension. As seen, this study tackled the traits of forgiveness and rumination levels of individuals. However, in other studies, which ascertained significant levels of relationship between rumination and forgiveness of others, it is remarked that they mostly included at least one of these traits' state-trait dimension and therefore different measurement tools were utilized (e.g., Karremens & Smith, 2010; McCullough, Bono & Root, 2007; Stoia-Caraballo et al., 2008). Consequently, we believe that this finding, which is not in line with the literature, was achieved in this study because both variables were regarded as dispositional features.

Discussion of Findings Related to the Prediction of Self-Forgiveness

The results of the study revealed that self-forgiveness was negatively predicted by personal distress and rumination in order of significance. There is only a limited

number of studies investigating the relationships between self-forgiveness and empathy. When studies that have separately evaluated four sub-scales of empathy are explored, it is seen that the present study achieved parallel findings, especially from the perspective of the relationship between personal distress and self-forgiveness. For example, studies by Hodgson and Wertheim (2007), Ranganathan and Todorov (2010), and Tagney, Boone, and Dearing (2005) found that peoples' levels of self-forgiveness decreased as their personal distress levels increased. People begin to think that they have made a transgression and feel such emotions as guilt and shame when they become aware of the fact that some of their behavior actually hurt someone (Hall & Fincham, 2005). In such cases, it is thought that individuals with high levels of personal distress will feel even more distress in trying to understand the negative feelings of the person whom they had hurt and that they will begin to focus more on their own feelings, which are felt more intensively than the feelings of others and they therefore may have a hard time in forgiving themselves and instead keeping their negative feelings towards themselves alive.

The number of studies that have considered self-forgiveness and rumination together are limited. It is seen, however, that there is a parallel between the findings of this study and others. For instance, Barber, Maltby, and Macaskill (2005), in their study investigating the relationships between college students' levels of forgiveness and rumination, concluded that students' engagement with ruminative thoughts about their memories related to anger made it hard for them to forgive themselves. In addition to these, the results of two studies (Bugay, 2010; Bugay & Demir, 2011) exploring the levels of self-forgiveness in college students in Turkey also match with this finding of the study at hand. Both studies ascertained that rumination had a negative relation to self-forgiveness.

As a result, it is seen that this finding of the study is consistent with other arguments on self-forgiveness presented in the literature (Luskin, 2002; Worthington, 2006). As was also stated by Woodyatt and Wenzel (2013), in order for individuals—who feel that their acts hurt another person or themselves directly—to actually forgive themselves, they need to become aware of their own responsibilities, to understand feelings of guilt and their consequences, and to make cognitive efforts to cope with the condition in an effective and healthy way. Although individuals enter into an intensive and repetitive thought process during rumination, it is known that this tendency is rather distant from an active cognitive effort to solve the problem (Nolen-Hoeksema, 1987). It seems possible to argue that, in this case, individuals with a high tendency for rumination will be continually engaged in the feelings, like guilt and shame, that they feel about a problematic situation and in behavior like being angry at themselves, self-criticism, and questioning the concept of self instead of making an effort to transform their negative feelings about themselves into positive ones. Therefore, they will find it hard to forgive themselves.

The results of the study also showed that interpersonal cognitive distortions did not make a significant contribution to the prediction of individuals' levels of self-forgiveness. The process of self-forgiveness entails behavior during which individuals violate their own assumptions or principles about themselves rather than

their assumptions about others (Thompson et al., 2005; Worthington, 2013). The individual behaves in such a way that he or she cannot integrate with the concept of self and needs to reconstruct his or her beliefs about his or her own (Worthington, 2006, 2013). Therefore, an individual's non-functional assumptions about the nature of interpersonal relationships or how they should be might not have an effect on the questioning and interpretation process regarding one's self.

College counselors often come across clients who suffer because they feel they have been hurt by someone else or that they have hurt another person. Within this context, we believe that professionals who conduct forgiveness-based interventions can benefit from the findings of the present study regarding the possible factors related to their clients' forgiveness of others and self-forgiveness. For instance, first of all, evaluating possible cognitive distortions about interpersonal relationships and, if there are any, forming therapeutic environments where clients will be able to transform their irrational beliefs about interpersonal rejections into more functional ones would be helpful in regard to experiencing the process of interpersonal forgiveness. Thereafter, as emphasized by most of the studies (Hui & Chau, 2009; Sandage & Worthington, 2010), practices that will help develop the perspective taking or empathic concern skills of clients can be incorporated into counseling or psychoeducation sessions. In addition, according to the findings, practitioners should consider rumination cycles in the context of hurtful experiences rather than as a personality trait. Similarly, therapeutic processes can be structured so that clients who have problems with self-forgiveness can become aware of the ways in which they feed their own negative feelings towards themselves within the cycle of personal distress and ruminative thinking. Also, time can be allocated to activities or practices that contribute to decreasing clients' personal distress and trait rumination levels within the scope of counseling sessions modules. Additionally, forgiveness can be handled as a variable of some specific hurtful experiences and whether the predictor role of other variables will change or not can be investigated, in contrast to this study. Specifically, the relationship between rumination and forgiveness of others can be reevaluated within this scope. Moreover, the role played by the sub-scales of rumination, brooding, and reflecting in predicting forgiveness can be explored separately. Furthermore, researchers may contribute to the literature on the cognitive dimension of forgiveness by conducting different studies on whether individuals' general cognitive distortions are related to forgiveness of others and whether individuals' own fundamental assumptions about themselves and their distortions reflecting their beliefs are related to self-forgiveness or not.

Although the current study makes significant contributions to the existing knowledge of the relationships among the study's variables, it has some limitations. First, the study was conducted in a cross-sectional manner. Therefore, findings must be interpreted with caution regarding causal inferences about the direction of the relationships. Second, the data were collected through self-report measures. Thus, results might be affected by participants' tendency to give socially desirable responses. Future research would focus on gathering information about the forgiveness process of people using various qualitative techniques.

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Başkalarını ve Kendini Affetme: Bilişsel Çarpıtmalar, Empati ve Ruminasyonun Yordayıcı Rolü

Atf:

Ascioglu Onal, A., & Yalcin, I. (2017). Forgiveness of others and self-forgiveness: The predictive role of cognitive distortions, empathy, and rumination. *Eurasian Journal of Educational Research*, 68, 97-120, <http://dx.doi.org/10.14689/ejer.2017.68.6>

Özet

Problem Durumu: Kişilerarası etkileşimin kaçınılmaz olduğu günümüz toplumunda; bireyler, başkaları tarafından incitildikleri ya da başkalarını incittikleri yaşantılarla sıklıkla karşı karşıya kalmaktadırlar. İncinme ya da incitme yaşantıları; öfke, intikam, suçluluk, utanç gibi olumsuz duyguları beraberinde getirmekte ve bireyin bu tür deneyimlerle etkili bir şekilde baş edememesi, depresyon ve kaygı gibi ruh sağlığı sorunları yaşamasıyla sonuçlanabilmektedir. Affedememe, bireyin yaşamındaki önemli stres kaynaklarından biri olarak görülmektedir. *Affetme ise*, bu stresli duygu durumuyla başa çıkmada kullanılabilen etkili bir mekanizma olarak kabul edilmektedir. Affetmenin terapötik bir araç olarak psikolojik danışma uygulamalarında kullanılabilmesi için, öncelikle bireylerin kendilerini ya da başkalarını affetmeleriyle ilişkili faktörlerin neler olduğunun ortaya konulması gerekmektedir. Özellikle Batılı toplumlardan kökenini alarak geliştirilmiş olan modellerin çoğunda; affetme ile ilişkili olduğu düşünülen özelliklerden birinin empati olduğu vurgulanmaktadır. Empati ve empatinin alt boyutları ile başkalarını affetme arasındaki ilişkileri ortaya koyan çalışmalar bulunmakla birlikte, toplulukçu ya da ilişkisel kültürlerde söz konusu değişkenler arasındaki bağlantıları inceleyen çalışmaların görece sınırlı sayıda olduğu dikkat çekmektedir. Özellikle kendini affetme ile empati arasındaki ilişkilerin, gerek kuramsal gerekse ampirik çalışmalarla yeterince incelenmediği görülmektedir. Alanyazında, affetme sürecinde etkili olduğuna vurgu yapılan bir diğer psikolojik özellik ise ruminasyondur. Bireyin yapılan hataya ilişkin olayları, olayların sonuçlarını, hissettiği olumsuz duyguları tekrar tekrar düşünmesi, olumsuz duygu durumunu sürekli canlı tutmakta ve kişi, bu kısır döngü içerisinde kendisini ya da başkalarını affetme konusunda güçlük çekmektedir. Psikolojik danışma alanında, konu ile ilgili yapılan çalışmalarda; ruminasyonun, hem başkalarını hem de kendini affetme ile olumsuz yönde ilişki gösterdiğini ortaya koyan çalışmalar olduğu görülmektedir. Ancak bireyin genel olarak ruminatif düşünme eğiliminin mi yoksa incinme ya da incitme durumuna özgü ruminasyon sürecinin mi affetmeyi etkilediği konusunda daha fazla çalışmaya ihtiyaç duyulduğu görülmektedir. Affetme; duygulardaki, davranışlardaki ve güdülerdeki değişimin yanı sıra bireyin bilişsel süreçlerindeki farklılaşmayı da beraberinde getiren bir süreçtir. Bireyler, dünyalarının ve kişilerarası ilişkilerinin nasıl olması gerektiğine ilişkin temel bazı varsayımlara sahiptirler ve hem kendilerinden hem de diğer insanlardan söz konusu ilkelere göre davranmalarını

beklemektedirler. İncinme ya da incitme yaşantıları ile birlikte bireylerin söz konusu varsayımları sarsılabilmekte ve affetme sürecinde bu algılarını yeniden yapılandırma ihtiyacı hissetmektedirler. Affetme temelli bazı müdahale çalışmalarında, bireylerin bilişsel çarpıtmaları ve otomatik düşüncelerinin yeniden ele alınmasına yönelik müdahalelere yer verilmesine karşın, affetme ve bilişsel yapının bu temel öğeleri arasındaki ilişkileri inceleyen çalışmaların oldukça sınırlı sayıda olduğu dikkat çekmektedir. Özellikle bireylerin kişilerarası ilişkilerin doğasına yönelik geliştirmiş olabilecekleri bazı inançlarının, affetmeye karar verme aşamasında engeller yaratabileceği düşünülmektedir. Bu durumda, bilişsel olarak karar verme ile başlayan affetme sürecini zorlaştıran birincil kaynaklardan biri; sanılanı aksine, empati kurma azlığı ya da ruminatif düşünme yüksekliğinden ziyade, bireyin ilişkilerle ilgili sahip olduğu bazı algılarıyla ilişkili görünmektedir. Bu bağlamda affetmenin psikolojik danışma uygulamalarına etkili bir şekilde dahil edilebilmesi için, özellikle Türk kültüründeki bireylerin hem kendilerini hem de başkalarını affetmeleriyle bağlantılı olabilecek psikolojik özellikleri ortaya koyan çalışmalar yapılmasına ihtiyaç duyulduğu görülmektedir.

Araştırmanın Amacı: Bu araştırmanın amacı, üniversite öğrencilerinin başkalarını ve kendini affetme düzeylerinin; ilişkilerle ilgili bilişsel çarpıtmalar, empati ve ruminasyon tarafından anlamlı düzeyde yordanan yordandığına incelenmesidir.

Araştırmanın Yöntemi: Araştırma, ilişkisel tarama modeline dayalı betimsel bir çalışmadır. Ankara ilindeki farklı üniversitelerde öğrenim görmekte olan 527 öğrencinin katılımı ile gerçekleştirilmiştir. Katılımcılar uygunluk örnekleme yoluyla çalışmaya dahil edilmiştir. Araştırmada katılımcılardan veri toplama amacıyla Kişisel Bilgi Formu, Heartland Affetme Ölçeği, Kişilerarası Tepkisellik İndeksi, Ruminasyon Ölçeği kısa formu ve İlişkilerle ilgili Bilişsel Çarpıtmalar Ölçeği kullanılmıştır. Heartland Affetme Ölçeği; 18 maddeden oluşmaktadır ve 7'li Likert tipindedir. Ölçeğin başkalarını, kendini ve durumu affetme olmak üzere üç alt boyutu bulunmaktadır. Katılımcıların empati düzeylerini ölçmek amacıyla kullanılan Kişilerarası Tepkisellik İndeksi ise 5'li Likert tipindedir ve 28 maddeden oluşmaktadır. Ölçeğin perspektif alma, empatik ilgi, kişisel rahatsızlık ve fantezi adı verilen dört alt boyutu bulunmaktadır. On maddeden oluşan Ruminasyon Ölçeği kısa formu ise 4'lü Likert tipindedir ve ölçeğin saplantılı düşünme ile derinlemesine düşünme şeklinde iki alt boyutu bulunmaktadır. İlişkilerle ilgili Bilişsel Çarpıtmalar Ölçeği ise 19 maddeden oluşan, 5'li Likert tipi bir ölçektir. Ölçeğin yakınlıktan kaçınma, gerçekçi olmayan ilişki beklentisi ve zihin okuma alt boyutlarından oluştuğu görülmektedir. Araştırmada İlişkilerle ilgili Bilişsel Çarpıtmalar Ölçeği'nin alt boyutları ve Kişilerarası Tepkisellik İndeksi'nin alt boyutları ile Ruminasyon Ölçeği kısa formu toplam puanlarının birlikte, başkalarını ve kendini affetme toplam puanlarını yordama gücü aşamalı çoklu doğrusal regresyon analizi aracılığıyla incelenmiştir. Katılımcıların kendini ve başkalarını affetme düzeyleri yordanan değişkenler olarak ele alınmış ve analizler her iki değişken için ayrı ayrı yürütülmüştür.

Araştırmanın Bulguları: Araştırma sonucunda; ilişkilerle ilgili bilişsel çarpıtmaların yakınlıktan kaçınma alt boyutu ile empatinin perspektif alma ve empatik ilgi alt

boyutlarının, başkalarını affetmenin anlamlı birer yordayıcısı oldukları ve söz konusu değişkenlerin birlikte başkalarını affetmedeki toplam varyansın yaklaşık %8'ini açıkladıkları bulunmuştur ($R = .273$, $R^2 = .075$, $F_{(3, 523)} = 14.077$, $p = .000$). Değişkenlerin başkalarını affetmeyi açıklamadaki göreceli önem sıraları incelendiği zaman; en güçlü yordayıcının yakınlıktan kaçınma olduğu ($\beta = -.172$) ve bunu sırasıyla perspektif alma ($\beta = .121$) ve empatik ilginin ($\beta = .107$) takip ettiği görülmüştür. Değişkenlerin kendini affetmeyi yordamadaki rolleri incelendiği zaman ise; empatinin kişisel rahatsızlık alt boyutunun ve ruminasyonun anlamlı birer yordayıcı oldukları ve ilgili değişkenlerin birlikte kendini affetmedeki varyansın yaklaşık %8'ini açıkladıkları tespit edilmiştir ($R = .282$, $R^2 = .079$, $F_{(2, 524)} = 22.589$, $p = .000$). Değişkenlerin göreceli önem sırasının kişisel rahatsızlık ($\beta = -.180$) ve ruminasyon ($\beta = -.176$) şeklinde olduğu görülmüştür.

Araştırmanın Sonuçları ve Önerileri: Araştırma sonucunda bireylerin kişilerarası ilişkilerinde yakınlıktan kaçınmaya yönelik düşünceleri ya da inançları azaldıkça ve perspektif alma ve empatik ilgi geliştirme düzeyleri arttıkça; başkalarına karşı affedici olma eğilimlerinin arttığı tespit edilmiştir. Bunun yanı sıra kişisel rahatsızlık düzeyi ve ruminatif düşünme eğilimi yüksek olan bireylerin ise yaptıkları hatalardan dolayı kendileri affetme konusunda zorlanabilecekleri sonucuna ulaşılmıştır. Bu durumda özellikle başka bir bireyi affedemediği için zorlanan ve acı çeken danışanlarla çalışırken; öncelikle bireyin olası çarpıtılmış inançlarının olup olmadığının incelenmesinin ve bu inançlar üzerinde çalışılmasının daha etkili sonuçlar doğuracağı söylenebilir. Ayrıca affetme temelli bireysel ya da grupla psikolojik danışma uygulamalarına; yakınlıktan kaçınmaya yönelik inançları sorgulamaya ya da perspektif alma ve empatik ilgi geliştirmeye yönelik modüllerin eklenmesinin işlevsel olacağı düşünülmektedir. Bunların yanı sıra yaptığı bir hatadan dolayı kendini affetme konusunda sorunlar yaşayan bireylere sunulacak hizmetlerde ise kişisel rahatsızlık düzeyinin ya da ruminatif düşünme eğiliminin dengelenmesine dikkat edilmesinin önemli olduğu görülmektedir.

Anahtar Kelimeler: affetme süreci, yakınlıktan kaçınma, perspektif alma, ruminatif düşünme.



Investigation of the Nature of Metaconceptual Processes of Pre-Service Biology Teachers*

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ABSTRACT

Purpose of Study: The aim of this study is to investigate the nature of pre-service biology teachers' metaconceptual processes that were active as they participated in metaconceptual teaching activities. **Methods:** Several instructional activities, including poster drawing, concept mapping, group and class discussions, and journal writing, were carried out to activate the metaconceptual processes of 32 second-grade, pre-service biology teachers in order to change their alternative conceptions regarding seed plants. Case study was used as a research method. Among the 32 participants, five participants who activated five participants who activated

rich and diverse metaconceptual processes and who reflected well and clearly on their mental processes in their journals were selected for the case study. The journal entries written by these five students before, during, and after the teaching activities were used as a data source. Content analysis was used to code the journals of the pre-service teachers according to the types and the content of metaconceptual processes. **Results and Conclusions:** The results indicated that students engaged in several types of metaconceptual activities, which can be classified under metaconceptual awareness, metaconceptual monitoring, and metaconceptual evaluation. Metaconceptual processes were activated interdependently in different forms, ranging from simpler first-order metaconceptual awareness to more sophisticated metaconceptual evaluations. **Recommendations:** In designing metaconceptual teaching activities, teachers should take the interdependent and multifaceted nature of these processes into consideration.

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Introduction

Since it has been coined by Flavell (1979), a growing body of literature has highlighted the role that metacognition plays in student learning. The promising results of many studies that promote student learning through the facilitation of metacognition have attracted the attention of many researchers (Baird, 1986; Gunstone & Mitchell, 1998; Hennessey, 2003; White, 1988). Although metacognition has been one of the most prominent constructs studied in cognitive psychology, mathematics, and science education, it was described as a “fuzzy concept” due to its multidimensional nature (Flavell, 1981, p. 37). Nevertheless, various definitions of metacognition have been proposed in the literature. Flavell (1987) defined metacognition as “knowledge and cognition about cognitive objects, that is, about anything cognitive” (p. 21). Brown (1987, p. 66) emphasized the executive control processes described metacognition as “one’s knowledge and control of own cognitive system.” She described executive control processes as the operation of the mental processes by which individuals organise and monitor their own thinking. Hennessey (2003) underlined the importance of awareness by defining metacognition as one’s inner awareness about one’s learning process, such as what one knows or one’s current cognitive state (Hennessey, 2003). Similarly, according to Kuhn and Dean (2004), metacognition refers to “awareness and management of one’s own thought” (p. 270).

Although various researchers have provided different definitions of metacognition in the literature, three common aspects of metacognition are present throughout all the classifications: (a) knowledge about cognition, (b) control and regulation of cognitive activities, and (c) awareness of mental activities and content (concepts) (Saçkes & Trundle, 2016). These aspects have appealed to many researchers from such diverse areas as reading comprehension, problem solving, memory development, cognitive development, and intelligence (Campioni, 1987). In recent years, one of the subject areas in which researchers have increasingly appreciated the importance of metacognition has been science education, specifically science concept learning.

Metacognition and Conceptual Change

The results of the studies that have focused on science concept learning have showed that students arrive at learning situations with existing conceptions that are different from the scientific conceptions (Caramazza, McCloskey, & Green, 1981; Driver & Easley, 1978; Driver & Erickson, 1983). Among the various terms that have been used to label these conceptions, “alternative conceptions” has become popular. The resistance of student alternative conceptions to change has been a significant problem in teaching and learning science. Numerous studies showed that students’ difficulties in learning science stem from their preexisting conceptions about natural phenomena that are not consistent with scientifically accepted ones (Champagne, Gunstone, & Klopfer, 1985; West, Fensham, & Garrard, 1985). Recognition of the importance of student alternative conceptions has led researchers in the field of science education and cognitive psychology to search for theoretical frameworks to

explain how alternative conceptions develop and how learners restructure their existing conceptions. Drawing upon an analogy between the knowledge constructed in the scientific community and the concepts constructed in students' minds, Posner, Hewson, Gertzog, & Strike (1982) proposed the conceptual change model. This model emphasises learners' recognition of the limitations of their alternative conceptions. Learners should understand and find the new conceptions plausible and fruitful to change their alternative conceptions with scientific conception. Several researchers who work in cognitive psychology have highlighted the importance of learners' ontological and epistemological presuppositions in the development of alternative conceptions (Chi, Slotta, & Leeuw, 1994; Vosniadou, 1994). diSessa (1993) pointed out that learners' use of p-prims which are context-dependent, self-explanatory knowledge pieces used to explain a phenomenon. According to this view, student conceptions were considered to be fragmented rather than cohesive or theory-like.

Although there are some differences in the views of these researchers about the nature of student conceptions, they did not consider conceptual change as a simple replacement of the previous conceptions with new ones. Rather, conceptual change was regarded a complicated process that involves a major multifaceted restructuring of the mental structure and its underlying elements. This restructuring is more likely to occur and be efficient if learners become aware of their existing conceptions and elements of their cognitive structure, compare and contrast existing and new scientific ideas, and notice the limitations of existing ideas (Yuruk, 2005). The nature of these processes has led researchers to focus on metacognitive processes that are acting on learner conceptions.

The intentional conceptual change perspective, which is relatively a more recent model of conceptual change, advocated for a "warmer" perspective of conceptual change (Sinatra & Pintrich, 2003). Researchers who have adopted this perspective argued that, along with the cognitive factors, conceptual change depends also on learners' metacognitive, motivational, and affective processes. (Sinatra & Pintrich, 2003). Luque (2003) highlighted the importance of metacognition in conceptual change by suggesting that learners must be aware of the need for the change, be able to know what to change, and be able to regulate their change processes using cognitive and metacognitive strategies. The interest of researchers in metacognition has been triggered by the convincing results of several studies that have focused on the role of metacognition in conceptual change. These studies showed that metacognition may play a crucial role in conceptual change in different ways. By engaging in metacognitive processes, learners recognise the inconsistencies between their alternative ideas and scientific concepts (Pintrich et al., 1993; Thorley, 1990; Vosniadou, 1994, 2007; Yuruk, 2007; Yuruk, Beeth & Anderson, 2009). This helps students to monitor changes in their understanding throughout instruction (Mason & Boscolo, 2000; Yuruk, 2007) and promotes a more coherent and durable conceptual understanding (Georghiades, 2000, 2004; Trundle et al., 2007; Yuruk et al., 2009; Yuruk & Eroğlu, 2016).

Metaconceptual Processes

The term “metacognition” has been used as an umbrella term that includes various types of knowledge and processes, some of which are not directly related to concept learning. Researchers who have investigated the role of metacognition in conceptual change generally prefer to use the term “metaconceptual” instead of “metacognition” to denote the second-order processes that are directly related to conceptual learning (Delgado, 2015; Kirbulut, Uzuntiryaki-Kondakçı, & Beeth, 2016; Saçkes & Trundle, 2016; Thorley, 1990; Vosniadou, 2003; Yuruk, 2005; Yuruk et al., 2009). Thorley (1990) defined the term “metaconceptual” as the kind of awareness that allows learners to reflect on the content of their conceptions.

In an effort to categorize the types of processes under the heading of metaconceptual processes, Yuruk (2005) proposed three types of metaconceptual processes: (1) metaconceptual awareness, (2) metaconceptual monitoring and (3) metaconceptual evaluation. Yuruk (2005) described metaconceptual awareness as “a process in which the learner explicitly refers to her/his personal stock of information including current or past ideas regarding a concept, presuppositions, experiences, and contextual differences” (p. 157). She differentiated two types of metaconceptual awareness: first-order and second-order metaconceptual awareness. First-order metaconceptual awareness is a process in which learners explicitly recognise stored or dynamically-generated ideas or the elements of their conceptual ecology. For example, if a learner states that s/he believes that force is something that can be transferred from one object to another in response to a question regarding force, s/he explicitly recognises her or his current mental representation about force concepts. Second-order metaconceptual awareness refers to learners’ awareness of their ideas and the elements of conceptual ecology that they previously had in their minds. For example, if a learner states that s/he thought that a flower was a colourful part of a plant during a group discussion about flower concepts a week ago, s/he is referring to the idea that s/he had a week ago.

Yuruk (2005) defined metaconceptual monitoring as the “online” and “in the moment” processes “that generate information about an ongoing cognitive activity, thinking process, or one’s present cognitive state” (p. 160). Unlike the metaconceptual awareness, metaconceptual monitoring involves learners’ monitoring their cognitive state with respect to new conceptions. There are five types of processes under the heading of metaconceptual monitoring: monitoring understanding of an idea, monitoring information coming from other people or sources, monitoring the consistency between existing ideas and new information, monitoring existing ideas, and new experiences and monitoring changes in ideas.

Metaconceptual evaluation involves learners’ judgmental decisions about competing ideas. In doing this, they provide justifications for their ideas. They may compare and contrast the plausibility and usefulness of competing ideas, or they may choose one idea among several alternatives and provide justifications for the validity of the chosen idea as they engage in metaconceptual evaluation (Yuruk, 2005).

Yuruk (2005) argued that metaconceptual processes are multi-faceted and interdependent and occur at various levels of complexity. She warned that, depending on the nature of the instructional environment, students' cognitive structure and content area may cause different metaconceptual processes to occur, or distinct characteristics of them might be observed. Metaconceptual processes carry sophisticated, higher-order thinking processes that are difficult to engage by learners in traditional learning environments. In this study, metaconceptual teaching interventions that aim to facilitate pre-service biology teachers' engagement in metaconceptual processes were implemented. The aim of this study was to explore the nature of the metaconceptual processes that were activated throughout these metaconceptual teaching interventions. A closer look at the nature of metaconceptual processes is crucial for a better understanding of how to facilitate and improve metaconceptual processes in learning environments.

Method

Research Design

In this study, a case study design which is one of the qualitative research methods was employed in order to determine the nature of pre-service teachers' metaconceptual activities throughout the metaconceptual teaching interventions. The case study is used in situations in which multiple evidence or data sources are used. It is also used as a method to examine a phenomenon or an event in-depth and when researchers are interested in understanding the "process" (Merriam, 1998, p. 33). This study employed the embedded case study design for which the unit of the analysis was five pre-service biology teachers. In this study, in order to activate the pre-service teachers' metaconceptual processes as explained above, several instructional activities, namely metaconceptual teaching activities were implemented for a period of 10 weeks. Journal entries that students wrote throughout the metaconceptual teaching activities were used as the data source for this case study.

Participants of the Study

Thirty-two pre-service biology teachers who were enrolled in the department of biology education of a state university were involved in metaconceptual teaching interventions. These students were in their second year of the program and had not taken any undergraduate level courses specifically related to seed plants. However, they had taken general botany, cryptogam courses, and related laboratory courses. The class was scheduled to meet once a week for seed plants laboratory. Intensity sampling (Patton, 1990) was used to identify the participants for case study. An intensity sample involves the selection of information-rich cases that intensely manifest the phenomenon of interest. Five students were selected among the 32 participants who activated rich and diverse metaconceptual processes throughout the instructional activities and reflected on their mental processes well in their journals. In the entire class, the number of female students was much higher compared to the number of male students. During the instructional interventions, there were group activities. An effort was made to select the participants among the

students who work in different groups. Two participants worked in the same group and the other three students worked in separate groups. Four out of the five students were female and one student was male.

Metaconceptual Teaching Activities

In this study, in order to examine the nature of students' metaconceptual processes, several instructional activities were used to facilitate their engagement in the targeted metaconceptual processes. These instructional activities consisted of an amalgamation of various types of activities including poster drawings, journal writing, concept mapping, and class and group discussions. These activities were implemented in a ten-week period in the seed plant laboratory. These activities were not implemented independently in a specific order. Class discussions were carried out usually after activities that were executed as a group, including poster drawings and group discussions. Pre-service teachers were requested to write journals before and after poster drawings, after drawing concept maps, following the group/class discussions and after the teacher introduced the scientific phenomena. Therefore, journal entries written by the pre-service teachers highly reflected the richness and the diversity of metaconceptual processes that they activated during the metaconceptual activities. The metaconceptual teaching interventions used in this study are described below.

Poster production. Poster drawing was used to facilitate pre-service teachers' engagement in metaconceptual awareness and metaconceptual monitoring. Posters about flowering and seed plants, fruits, and seeds were prepared in groups of four people. Towards the end of the teaching activities, the posters prepared by the students during the early stages of instruction were given back to them. Students were asked if they wanted to make any changes in the previously prepared posters. Examples of the prompts for the poster drawing activity are provided below.

Prepare a poster reflecting what you know about flowering and seed plants with your group. Your poster may include elements below.

- Definitions (flowering plants and non-flowering plant, seed plants, and non-seed plants, flower, seed)
- Examples (give examples of flowering plants and non-flowering plants, seed plants and non-seed plants)
- Figures, relating diagrams and concept maps
- Function (basic functions of flowers)
- Give examples of the plants that you have difficulty categorising under flowering and seed plants.
- Discuss your ideas and reasoning before preparing your poster whose content was provided above with your group members. Present your posters with your group members to your classmates.

Concept mapping. Concept maps were used in order for the pre-service teachers to determine the relationships between the different conceptions and the differences about flowering plants and seed plants. As in the poster drawing activity, in order to make students monitor the changes in their ideas, the concept maps prepared by the

students were given back to them and they were asked to think about the changes they wanted to make in their concept maps. The prompts used for the concept mapping activity are presented below.

Associate the concepts given below by drawing a concept map. You can draw the concept map in your journal.

- Plant, flowering plant, non-flowering plant, seed plant, flower, seed, fruit, leaf, reproduction organs.
- Draw a relationship between the words given above and other words that have come to your mind by creating a concept map.
- Put the examples given below into suitable places in the concept map.
- Populus, fern, pine, onion, nut, apple tree, rose plant, parsley, cabbage, carrot, wheat, willow, lettuce, banana, grass.

After creating your concept map, pair up with one of your classmates and explain your concept maps to each other. Discuss the similar and different aspects between your concept maps.

Journal writing. Journal writing aims to encourage pre-service teachers to refer to their existing conceptions, monitor their understanding and the differences in different views, judge the validity of competing ideas, recognise the limitations of their views, look for consistency among their initial and current ideas across different contexts, and monitor the changes in their ideas that emerged throughout the metaconceptual teaching activities. These aspects of the journal entries encourage participants to cover most of the targeted metaconceptual processes. Pre-service teachers were requested to write journal entries nine times during the instructional activities. Below are some examples of the journal prompts used in this study.

You discussed your initial ideas about fruits and seeds while you were preparing your posters. Write about the following issues in your journal.

During your discussion,

1. Did you notice any differences between your ideas and other group mates' ideas?
2. In what ways were their ideas different from yours?
3. Which idea is more attractive to you? Why?
4. Have you changed any of your initial ideas during your group discussions? If yes, why do you think your current ideas are better than your initial ideas?
5. Have you noticed any subjects that you did not know before?
6. Were there any examples that you had difficulty categorising as fruits or seeds?
7. Are there any concepts that are still not clear in your mind about the subjects that were discussed?

Classroom and group discussions. The classroom and group discussions aimed to share the opinions held by the members of the class about flowering plants.

Classroom discussions were generally executed after the poster drawing, concept mapping, and group discussions. During the classroom discussions, the instructor did not define the scientifically acceptable concepts until there were no other things to be expressed by the students about the targeted concepts.

Data Source and Data Analysis

During the instructional interventions, the journal writing activity was used in combination with other instructional activities. Since the pre-service teachers' journal entries highly reflected their cognitive and metaconceptual processes throughout the various instructional activities, they were used as a data source to identify the types and the nature of students' metaconceptual processes. Journals from all students were examined first individually by each researcher. Then, three researchers came together to discuss the richness and variety of the metaconceptual processes found in the journals. Among all the journals, five pre-service teachers' journals were selected as a data source. These journals were chosen due to the clarity of the students' ideas or mental processes, and the richness of the diverse types of metaconceptual processes. To differentiate among various types of metaconceptual processes, content analysis was used to code the pre-service teachers' journals according to the types and the content of metaconceptual processes. Data analysis focused on seeking confirmation concerning each of the five pre-service teachers' engagement in several types of metaconceptual processes. Researchers examined the data to find segments that exemplified each category of the metaconceptual processes. When a segment included the characteristics of more than one type of metaconceptual process, that segment was placed in more than one category. During the data analysis, the data segments were assigned to codes through a consensus among the three researchers. Tables were generated by using the data segments that were coded into different metaconceptual activities. These tables included only the data segments that best represented each type of metaconceptual process rather than all data segment of five participants. Moreover, they were selected to be included in the tables so as they demonstrated a diversity of metaconceptual processes in different topics. The data segments of all the participants were not included in the tables because the aim of this study was not to examine all the metaconceptual processes activated by each participant, but rather to identify the structure and the nature of the metaconceptual processes that became explicit throughout the instructional activities. To ensure the trustworthiness of the findings of the study, strategies such as prolonged engagement, peer debriefing, and thick descriptions were used. All the researchers were present in the research setting for about 10 weeks during the implementation of the study. Researchers regularly congregated to discuss the coded data segments. Thick descriptions of the experiences, context of the research site, and the instructional activities performed in classroom were provided.

Results

Data collected from five pre-service biology teachers were used to explain the nature of each type of metaconceptual process by providing exemplary excerpts taken from their journals. Each type of metaconceptual process was described by providing examples from all content areas covered by the designed instructional activities (e.g. flowering plant, seed plant, and non-seed plant; flower, single and composite flower; seed, fruit, single and compound fruit; monocotyledon, and dicotyledon plants). Examples for each of the categories used by students are provided below. The nature of each type of metaconceptual process is explained by using the examples given in the tables.

Metaconceptual Awareness

Yuruk (2005) stated that there are two types of metaconceptual awareness: (a) first-order metaconceptual awareness, and (b) second-order metaconceptual awareness. The data collected from five participants included indications that these two types of metaconceptual awareness were activated throughout the instructional interventions.

A. First-Order Metaconceptual Awareness

Excerpts that provided evidence for students' engagement in first-order metaconceptual awareness are exemplified in Tables 1, 2, and 3.

Sample journal entries for student engagement in first-order metaconceptual awareness of mental models and ideas/conceptions are provided in Table 1.

Table 1.

First-Order Metaconceptual Awareness of Mental Models and Ideas/Conceptions

<i>Topics</i>	<i>Related Data Segments</i>
Seed and flowering plants conceptions	Student N: Flowering plants mean that a plant that has colourful leaves.
	Student E: All flowering plants are seed plants and all non-flowering plants are non-seed plants at the same time. As examples for flowering plants, cherry and apricot, for non-flowering plants, we can give willow. Cherry and apricot are flowering plants, they blossom and from the seed form cherry and apricot and grow again. For non-flowering plant, willow is given as an example because the leaf differentiates and doesn't form a colourful thing like a flower.
Simple and compound flower	Student E: The first thing coming to my mind when simple and compound flower conceptions are mentioned is stamen/anther and pistil. If it has only one of these, it is a simple flower, if it has both of them, it is a compound flower.

Table 1 continued

Topics	Related Data Segments
Simple and compound fruit	Student C: <i>Simple fruit: Since fruit grows from the development of the ovary, simple conception shows that it grows from only one ovary. E.g.: apricot</i>
	<i>Compound fruit: It occurs from more than one ovary. E.g.: strawberry</i>
Fruit and seed	Student I: <i>Simple and compound flowers can be like simple and compound fruit. For example, blackberry is a compound fruit. So, its flower is also compound. A plum is a simple fruit. Its flower is also simple, because the flower produces the fruit.</i>
	Student C: <i>Vegetable is a vegetable if the leaf is the part which is eaten. If the part that is eaten is juicy and abundantly nutrient, it is fruit. We can give lettuce, cabbage as examples for vegetables. As examples for the fruit, we can give peach, banana.</i>
Gymnosperms and angiosperms	Student E: <i>Seed plants are categorised into two groups as gymnosperms and angiosperms. When gymnosperms are mentioned, pine comes to mind at first. When gymnosperm plants are mentioned, I think of the falling of the seed formed with the opening of the fruit naturally. In angiosperms, it is the fact that fruit and the seed are in the same place, meaning that the seed is covered by the fruit. For example, apricot.</i>
	Student N: <i>If the seed is in an open place and can be affected by the environment directly, this plant's seeds are also in an open position and it is called a gymnosperm plant. If the seed is covered by an external membrane and it is not affected by the outer effects, this plant's seed is an angiosperm and the plant is an angiosperm plant.</i>

The data segments coded as first-order metaconceptual awareness show that students were aware of their different ideas that they had about the differences between flowering and non-flowering plants, simple and compound flowers, simple and compound fruits, fruit concepts, and the differences between gymnosperms and angiosperms. The parts of student journal entries given in Table 1 demonstrate that students were able to explicitly state their conceptions in different content areas. For example, student E was able to state her idea that a non-flowering plant does not have colourful leaves. She gave a willow as an example for the non-flowering plants due to the absence of colourful leaves, and she categorised cherries and apricots as flowering plants due to their blossoms; however, scientifically, a flowering plant does not necessarily have colourful leaves. It is understood that she referred to her past experience about the blossoming of apricot and cherry trees, and that of willow

trees not having apparent colourful leaves. Her journal entry indicated that she was aware of the criteria that she used to categorise flowering and non-flowering plants.

Student E devised a categorisation between flowering and non-flowering plants based on the colourful leaves. She also formulated a categorisation between simple and compound flowers based on the number of the types of reproductive organs. It is evident that she became aware of her categorisation criteria that simple flowers have only one of the reproductive organs and compound flowers have both of the female and male reproductive organs.

Although a fruit that develops from a compound flower may be a compound fruit or a simple fruit, student C made a generalisation about compound fruits. She explicitly stated that a simple fruit develops from a single ovary, and a compound flower develops from more than one ovary. She gave strawberries as an example for a compound fruit, although it is an aggregate fruit.

Although there is no scientific definition for vegetable according to the scientific community in the content area of seed plants, the journal entry provided by student C demonstrates that she had a conceptual category in her mind about vegetables. Based on her experience in her daily life, she differentiated vegetables and fruits. She categorised vegetables and fruits based on the characteristics of the part of the plant that is eaten. According to her, if the part of the plant that is eaten is a leaf, it is vegetable, such as lettuce and cabbage. She described fruit as the *"juicy and abundantly nutrient"* part of the plant, such as peaches and bananas. The excerpt taken from her journal entry shows that she was able to make her idea explicit about a scenically, non-existent category of a concept based on her experience from the daily use of this concept in the spoken language.

The journal entries provided above show that students referred to their alternative conceptions. There were also students who explicitly explained partially scientifically acceptable ideas. One of them was student N. She defined angiosperm plants as the plant whose seed is covered by *"an external membrane and it is not affected by the outer effects"*, while she described gymnosperm plants as the plant whose *"seed is in an open place and can get affected by the environment directly."*

Another type of first-order metaconceptual awareness that was activated throughout the instructional intervention was awareness of what you do not know. Excerpts from students' journal entries that exemplify their engagement in first-order metaconceptual awareness of mental models and ideas/conceptions are provided in Table 2.

As seen in Table 2, Student M learnt that forming a flower was a kind of leaf metamorphosis. She was aware that she did not know the steps of this metamorphosis. She drew an analogy between frog metamorphosis and leaf metamorphosis. Due to this analogy, she could not construct a mental representation of leaf metamorphosis. It is understood that she thought leaf metamorphosis was a gradual process that took place whenever a plant blossoms. It is evident that the

ideas discussed during the instructional activities caused this student to become aware that she could not construct a mental image of leaf metamorphosis.

Table 2.

First-Order Metaconceptual Awareness of What You Do Not Know

Topics	Related Data Segments
Definition of the flower and its parts	Student M: Forming of the flower had been discussed and it was emphasised a lot. I couldn't understand it at first, but later I learnt that flower is a leaf metamorphosis. <i>However, we know every step while we are learning metamorphosis phases in frogs; does it occur in similar steps in the process of turning of the leaf into a flower? This kind of information was up in the air.*</i>

*The sentences written in italics directly represent the targeted metaconceptual process.

Table 3 presents an example of students' journal entries that show student engagement in first-order metaconceptual awareness of contextual differences.

Table 3.

First-order Metaconceptual Awareness of Contextual Differences

Topics	Related Data Segments
Fruit and seed	Student N: <i>Fruits and vegetables are daily used conceptions and they are different from the conceptions used in biology. In biology, there is no concept of vegetable. Fruit is normally sweet, pulpy, and forms to be eaten, but biologically, pepper, aborigine are also fruit, and their taste isn't sweet.</i>

Student N's journal entry provides evidence for her awareness about the differences in the use of vegetable and fruit concepts in daily life and biology. She noticed that there was no vegetable concept in biology. She gave some examples to vegetables and stated that they are actually fruits in biology, although they are called vegetables in daily life. It is evident that student N was aware of the differences of the use of some concepts in different contexts.

B. Second-Order Metaconceptual Awareness

Sample excerpts from journal entries for student engagement of Second-Order Metaconceptual Awareness of Initial Ideas/ Mental Models are provided in Table 4.

Table 4.

Second-Order Metaconceptual Awareness of Initial Ideas/ Mental Models

Topics	Related Data Segments
Definition of the flower and its parts	<p>Student I: <i>Before taking this course, I had been thinking that a flower was a plant consisting of colourful leaves, good-looking, and it was as an ornament in most of the plants (daisy, rose) and had no other function. Since I defined the flower as good-looking to the eye and as a colourful form, I was saying that plants such as populus and pinus had no colourful leaves. Because there isn't any suitable colourful, good-looking forms to the eye (in my flower definition), I was saying that they had no flowers.</i></p>
	<p>Student N: <i>Previously I was thinking that flowers had good-looking leaves and smelt good. That's why I was classifying the plants with no beautiful colourful flowers into non-flowering plants category, but I knew that they grew with seeds, but I couldn't see the flowers.</i></p>
	<p>Student E: <i>We have written in all our definitions for the flower that it is the result of leaf metamorphosis.</i></p>
Seed and flowering plants conceptions	<p>Student N: <i>In the classroom activities, we had some wrong ideas about what the non-flowering plant was, myself included. We made two groups as seed and non-seed plants while classifying the plants. We made another two groups for the seed plants as flowering and non-flowering plants. The reason why we put the non-flowering plants into the seedless plants group was the fact that we knew there were seeds of some plants, but we didn't see their flowers. The most obvious example we were giving was grass as an example.</i></p>
	<p>Student E: <i>We have categorised the plants as seed and non-seed. This was a conception approved by scientists, but categorising the plants as flowering and non-flowering was not an accepted conception. The reason why we categorized the plants as flowering and non-flowering was the fact that we hadn't seen the flowers (meaning colourful petals), although we had seen some of the plants' seeds.</i></p>
	<p>Student N: <i>We defined the non-flowering plant wrong and put it into wrong category in the concept map. By definition, we said that it was the plant whose seed was not coming from the flower. But we understood that seed cannot grow in those. That's why the definition was completely wrong. We showed the non-flowering plants as a subcategory of seed plants. However, non-flowering plant was already the same as the non-seed plant. Moreover, we included the plants whose flowers haven't been seen, such as lettuce, parsley, grass, walnut, banana into the non-flowering plants. Later, we corrected them as flowering and seed plant.</i></p>

Table 4 continued

Topics	Related Data Segments
Simple and compound flower	Student E: The other conception that was not accepted by the scientists was simple and compound flowers. <i>We said that if it has only one of the reproductive organs, it is a simple flower, if it has both of the reproductive organs, it is a compound flower. The reason why we defined simple and compound flowers like this was the idea that having only one of these parts makes the flower more primitive, that's to say simple, having two of them is considered together, next to each other, that's to say compound.</i>
Fruit and seed	Student I: Also, I didn't know what vegetable-fruit conceptions were properly. <i>I was considering that fruit formed from one-year plants as vegetables. For example, tomato, onion, zucchini, cucumber, bean, etc. I was thinking of fruit as the same as tasty and juicy fruit that can be eaten (cherry, apple, pear, etc.). I was assuming that other plants had no fruit. For example, populus, grass, rose, pine, etc.</i>

Students engage in second-order metaconceptual awareness when referring to an idea that was made explicit in the past (Yuruk, 2005). The excerpts provided in Table 4 indicate that students were able to reflect on their ideas about flowering and seed plants, flowers, single and compound flowers, seeds, and fruit concepts that they explicitly recognise during different instructional activities. Under the headings of the definition of a flower and its parts, flowering and seed plant conceptions, it was seen that students previously thought that a flower should have colourful leaves and a nice smell. One of the students thought flowers were an ornament that a plant has. Regarding the categorisation of plants as seed and non-seed plants, or flowering and non-flowering plants, students mainly referred to their ideas that they activated during the concept mapping activity. For example, student N was aware that her group categorised plants firstly as seed and non-seed plants. Then, under the seed plant category, they classified seed plants into flowering and non-flowering plants. She was also aware of the reasons for making such a categorisation. She stated that they made such a categorisation because they knew some plants have seeds, but flowers cannot be seen on these plants. It is understood that their categorisation of flowering and non-flowering plants under seed plants originated from their definition of flower as having colourful leaves. Student N became aware that they gave some plants as examples of non-flowering plants, such as lettuce, banana, walnut, parley, and grass.

In terms of the simple and compound flower concepts, student E was aware of the criteria that she used to classify these flowers. For example, she referred to the idea simple and compound flowers were classified based on the number of reproductive organs. She thought that if a flower has one of the reproductive organs, it is a simple flower, and if it has both of the reproductive organs, it is a compound flower. She stated that they thought simple flowers were primitive. It is obvious that

the students perceiving the meaning of the word “simple” as “primitive” caused them to make such a categorisation.

Student I was aware of how stated that his differentiation of vegetables and fruits. He stated that he defined vegetable as being “fruit formed from one-year plants”, such as tomato, onion, bean, and cucumber. He explained that he “*was thinking the fruit as the same as tasty and juicy fruit which can be eaten (cherry, apple, pear, etc.)*.”

Students’ journal entries that provided evidence for their engagement of second-order metaconceptual awareness of “what you did not know” are listed in Table 5.

Table 5.

Second-Order Metaconceptual Awareness of What You Did Not Know

<i>Topics</i>	<i>Related Data Segments</i>
Seed and flowering plants conceptions	Student E: In the end of these discussions, what is a non-flowering plant? Is it in seed or non-seed plants? What are the examples of non-seed plants? Banana, populus, willow, grass, parsley, are in which group? <i>I realized that I didn't know.</i>
	Student M: <i>While forming the concept map, the trickiest part was determining what the non-flowering plants were and where they belonged in the concept map.</i>
Fruit and seed	Student C: <i>We live together with the plants actually, but we just realised and learnt some of their features. For example, we haven't asked questions such as, why do corns have stylus maydis? What does it help? I was thinking those stylus maydis were protective, but later I understood that these are the stylus under the rest of the top of the ovary.</i>

The journal excerpts from students E and M show that they became aware that they did not know how to categorise non-flowering plants. Student E was aware that she could not classify some examples of plants that they encountered in daily life. Under the heading of fruit and seed concepts, it is evident that student C did not know what the stylus maydis of corn was.

The examples under the heading of second-order awareness indicate that students became aware of their problems in categorising plants as flowering or non-flowering plants, vegetables and fruits, simple and compound flowers, and also in defining what a flower was. The findings regarding second-order metaconceptual awareness demonstrate that, in order to engage in second-order metaconceptual awareness, students should initially be active in terms of first-order metaconceptual awareness. In other words, first-order metaconceptual awareness is a requirement for the activation of second-order metaconceptual processes.

Metaconceptual Monitoring

Yuruk (2005) described metaconceptual monitoring processes as the “online”, “in the moment” processes that are related to “an ongoing cognitive activity, thinking process, or present cognitive state” (p. 284). There are different types of processes under the heading of metaconceptual monitoring.

A. *Monitoring of Understanding of an Idea*

Student engagement in metaconceptual monitoring is examined under different types of metaconceptual monitoring processes. Examples of student engagement in monitoring of understanding of an idea are provided in Table 6.

Table 6.

Monitoring of Understanding of an Idea

<i>Topics</i>	<i>Related Data Segments</i>
Simple and compound flower	Student M: <i>There have been some conceptions that I have had difficulty in understanding, of course Latin words in general. I haven't still comprehended some of them. I still have some questions such as, how can it be simple and compound? What/how does pseudocarp happen/occur/mean?</i>
Gymnosperms and angiosperms	Student I: <i>I had difficulty in understanding the simple-compound fruits and gymnosperms-angiosperms. That's to say, I was getting confused about which plant was the gymnosperm, which one was the angiosperm, and again, which fruit was simple, which one was compound.</i>

The excerpt from students journals show that they were able to monitor their understanding regarding simple and compound flower, gymnosperms and angiosperms. For example, student M stated that she had difficulty in understanding some Latin terms and the use of the words “simple and compound” in describing flowers and fruits. As student M monitored the ideas that she did not understand, I monitored that he had difficulty understanding simple-compound fruits and gymnosperms-angiosperms.

B. *Monitoring Ideas/Information from Other People/Source*

During the activities, students were able to notice the information provided from different sources and people. Table 7 includes examples from students' journal entries that show their engagement in monitoring ideas/information from other people or sources.

Table 7.

Monitoring Ideas/Information from Other People/Source

<i>Topics</i>	<i>Related Data Segments</i>
Seed and flowering plants conceptions	Student E: Everybody agreed on categorising the plants as seed and non-seed in the prepared concept maps and recent discussions. <i>However, a group put the non-flowering plants into both seed and non-seed plants. Also, they categorised the plants as flowering and non-flowering in general, but they couldn't explain how the seed was formed in non-flowering plants.</i>
Simple and compound flower	Student I: <i>... friend categorised the simple and compound flowers according to having a reproductive plant organ. If there is only one reproductive organ, it is simple, if both are present, it is compound, s/he said.</i>
Simple and compound fruit	Student N: <i>Some friends were thinking that the compound fruit was formed by more than one flower.</i>

Student E was able to monitor how different groups during the poster drawing activity classified plants. For example, she noticed that a group included non-flowering plants under the heading of both seed and non-seed plants. She noticed that a group who differentiated flowering and non-flowering plants could not explain how seeds were formed in non-flowering plants. Student I monitored the ideas of students who categorised simple and compound flowers based on the number of reproductive organs. Students N recognised that her friends thought that "compound fruit was formed by more than one flower". The excerpts indicate that students were aware of the ideas of other groups in the class. It shows that they monitored the ideas discussed or presented by other students during the instructional interventions.

C. Monitoring the Consistency between New Ideas and Existing Ideas

Students were not only aware of the other students' ideas, they were also able to monitor the consistency between their own ideas and the ideas coming from different sources. Table 8 presents sample excerpts from students' journal entries that provide evidence of students' engagement in this monitoring process.

As seen in Table 8, student I was able to monitor the differences in ideas between him and his friends about the categorisation of simple and compound flowers. He stated that, as his friend differentiated simple and compound flowers based on the number of reproductive organs, he made this categorisation based on the nature of the fruit. Students N engaged in a similar type of metaconceptual process. She was aware of her friends' idea that compound fruits were formed by more than one flower, although she thought that compound fruits were formed by more than one ovary.

Table 8.*Monitoring the Consistency between New Ideas and Existing Ideas*

<i>Topics</i>	<i>Related Data Segments</i>
Simple and compound flower	Student I: <i>There was an idea difference in male and female plant conceptions and simple and compound plants. To me, if a simple plant grows a simple fruit, it is a simple flower, if it grows a compound fruit, it is a compound flower. ... friend categorised the simple and compound flowers according to having a reproductive plant organ. If there is only one reproductive organ, it is simple, if both were present, it is compound, s/he said.</i>
Simple and compound fruit	Student N: <i>Also, in the discussions we have made, we thought about the compound fruit definition differently than friends. Some friends were thinking that the compound fruit was formed by more than one flower. I was thinking the compound fruit was formed by more than one different ovary.</i>

The excerpts indicate that in order to engage in monitoring the consistency between new ideas and existing ideas, students first must become aware of their own ideas and they also have to monitor the ideas coming from other people or sources. Therefore, these metaconceptual processes are a prerequisite for student engagement in monitoring the consistency between new ideas and existing ideas.

D. Monitoring Change in Ideas

As the ideas in students' minds change, students were able to monitor the changes in their ideas. Some excerpts from students' journal entries that demonstrate monitoring changes in their ideas are shown in Table 9.

As seen in Table 9, the excerpt from the journal entry of student M shows that she realised that she did not know the difference between flowering and non-flowering plants or seed and non-seed plants. She notice that her definition of flower was previously wrong. She previously defined flower as part of the plant that had perianth. She stated that her definition of flower changed after taking the course, as she realised that to identify a part of a plant as a flower, it must have reproductive organs rather than the colourful petals. She learnt that a flower does not necessarily have beautiful leaves. Similar to student M, student E became aware that she had misconceptions about flower concepts. She noticed that she thought that "the flower formed as the result of leaf metamorphosis." She learnt that "the flower was carrying the leaves that have faced the metamorphosis." The explanations of student N regarding the changes that she made in her concept map indicated that she was able to monitor the changes in her ideas regarding the definition and categorisation of non-flowering plants. She was aware that she previously put non-flowering plants as a category under the heading of seed plants. She noticed that non-flowering plants "was already the same as the non-seed plant."

Table 9.

Monitoring Change in Ideas

Topics	Related Data Segments
Definition of the flower and its parts	<p>Student M: <i>I realized that I could not understand the difference between flowering and non-flowering, seed and non-seed plants before taking this course. Also, I understood that the flower concept was wrong in our minds. For example, although we saw the flower of wheat all the time, I did not think that it was a flower. Because when thinking about flowers, an image of a flower that has perianth (calix+corolla) always appeared in my mind, and there was a very different definition of flower in my mind. According to the definition of flower in my mind, a flower must have perianth. After taking this course, I've learnt that the flower is a reproductive organ of flowering plants, and the parts that a flower must carry are the reproductive organs.</i></p> <p>Student E: <i>I have made the biggest misconception in defining the flower, because we were saying that the flower formed as a result of the leaf metamorphosis, but actually, the flower was carrying the leaves that have faced the metamorphosis. These two definitions were totally different from each other.</i></p>
Seed and flowering plants conceptions	<p>Student N: <i>We defined the non-flowering plant wrong and put it into wrong category in the concept map. By definition, we said that it was the plant whose seed was not coming from the flower, but seeds cannot grow in those. That's why the definition was completely wrong. We showed the non-flowering plants as a sub-category of seed plants. However non-flowering plant was already the same as the non-seed plant. Moreover, we included the plants whose flowers are not seen, such as lettuce, parsley, grass, nut, banana into the non-flowering plants. Later, we corrected them as flowering and seed plants.</i></p>
Fruit and seed	<p>Student C: <i>We live together with the plants actually, but we just realised and learnt some of their features. For example, we haven't asked some questions such as, why do corns have stylus maydis? What does it help? I was thinking those stylus maydis were protective, but later I understood that these are the stylus under the rest of the top of the ovary.</i></p>
Gymnosperms and angiosperms	<p>Student N: <i>I've also learnt that, except these, in gymnosperm plants, the seed is in an open position among the cone scales and these seeds aren't wrapped by the fruit leaves called carpel, and, as a result of this, no fruit formation was observed.</i></p>

She also stated that she categorised plants such as lettuce, parsley, grass, and nuts, which do not have colourful leaves, as non-flowering plants. She was aware

that she learnt that these plants were also examples of flowering plants. Student C monitored that she changed her idea regarding the stylus maydis of corn. Previously, she thought that the stylus maydis was a protective part of the plant. Later, she learnt that it was *"the rest of the top of the ovary."* Student N noticed that she learnt that, in gymnosperm plants, the seeds were not covered by carpel, and fruit formation was not observed in these plants. It is obvious from her journal entry that student N did not know this information before.

The journal entries that students provided indicate that students were able to monitor the changes in their ideas regarding different topics. In order to engage in this metaconceptual process, students must first become aware of their previous ideas and they must also become aware of their current ideas. To monitor the change in their ideas, they must compare their previous and existing ideas. Therefore, first-order metaconceptual awareness of their ideas and second-order metaconceptual awareness of their previous ideas are a prerequisite for student engagement in monitoring the changes in ideas. Additionally, students can also monitor what they learn as new information, namely the information that they did not know before.

Metaconceptual Evaluation

Metaconceptual evaluation is a process through which students evaluate the validity or plausibility of different ideas. Evidence of student engagement in metaconceptual evaluation from their journal entries is provided in Table 10.

As seen in Table 10, the journal entry written by student E shows that she did not find her friends' idea regarding putting non-flowering plants under the heading of both seed plants and non-seed plants during concept mapping activity. This idea was not plausible to her due to its deficiency in explaining how seeds are formed from non-flowering plants. The same student did not find her friends' idea regarding simultaneously categorising grass as a seed plant and as a non-flowering plant acceptable. She did not find this idea plausible due to its capability in explaining how seeds are formed in grass. In evaluating her friends' idea, it is evident that she firstly monitored the idea coming from other sources, and then she made a judgmental decision regarding the plausibility of her friends' idea. Student N meta-conceptually evaluated her idea about compound fruit with the idea of her friends. She noticed that she previously defined compound fruit as a fruit which *"was formed by more than one ovary"* and her friends defined it as a fruit which *"was formed by more than one flower."* Student N became aware that her previous idea was wrong and her friends' idea was correct.

Table 10.

Metaconceptual Evaluation

<i>Topics</i>	<i>Related Data Segments</i>
Seed and flowering plants conceptions	Student E: Everybody agreed on categorising the plants as seed and non-seed in the prepared concept maps and recent discussions. However, a group put the non-flowering plants into both seed and non-seed plants. Also, they categorised the plants as flowering and non-flowering in general, <i>but they couldn't explain how the seed was formed in non-flowering plants.</i>
Fruit and seed	Student E: Also, about grass, it was said that it is a seed and a non-flowering plant. <i>I was also thinking similar to this idea at that time. This idea was acceptable to my mind (because I did not see the flower of grass). The unacceptable side of this idea was that there is a part in the grass, and this part forms the seed. It was unacceptable to my mind since they could not explain how that part forms the seed.</i>
Simple and compound fruit	Student N: Also, in the discussions we have made, we have thought about the compound fruit definition differently than friends. Some friends were thinking that the compound fruit was formed by more than one flower. <i>I was thinking the compound fruit was formed by more than one ovary, but I have learnt that this thought of mine wasn't correct, because one fruit is formed from one flower, no matter how many ovaries it has. When we look at compound fruit examples, such as mulberry, it is formed by more than one flower. That's why my thought has changed.</i>

In the above examples provided from students' journal entries, metaconceptual processes from different students about different concepts were demonstrated. The excerpt provided below in Table 11 is a rich example that shows a single student's engagement in different metaconceptual processes.

As seen in Table 11, the journal entry of student I provides rich evidence for his engagement in different metaconceptual processes, such as first- and second-order metaconceptual awareness of his ideas, second-order metaconceptual awareness of what he did not know, metaconceptual monitoring of the change in his ideas, monitoring his understanding of his ideas, and metaconceptual evaluation. Student I monitored that his idea about the definition of the flower, vegetable-fruit, and seed-non-seed plant definitions and flowering-non-flowering plants had changed throughout the instruction. He noticed how his definition of flower affected his other ideas. Therefore, he described the definition of flower as the "most centred idea" in changing his opinions. He became aware that he defined flower as the part of the plant that had colourful leaves.

Table 11.*A Rich Example of One Student's Metaconceptual Processes*

<i>Student I's journal entry</i>	<i>Metaconceptual Processes</i>
Some of my opinions have changed since I started to take this lesson. The definition of the flower, vegetable-fruit and seed-non-seed plant definitions and the flowering-non-flowering plant definitions. To me, the most centred idea in changing of my opinions was the definition of the flower ¹ because we were defining the flower as "a form that has colourful parts and was formed after the metamorphosis of the leaf." That's why we were saying that plants with no colourful form did not have flowers ² . And again, I didn't know that fruit is grown from the flower, every flower absolutely grows fruit and seeds ³ . For example, I had never thought that fruit or the seed was grown from the flower of the rose plant. That's why I was thinking that the flower on this plant was just an ornament. Also, we were thinking that populus, willow had no flowers since it didn't have any colourful leaf parts ⁴ , but we've learnt that we knew the definition of the flower wrong ⁵ . I've learnt that the flower isn't formed as a result of the leaf metamorphosis, it carries the leaf that has faced metamorphosis, it is the reproductive organ of the plant and the ovule in the flower turns into the seed, and the ovary turns into fruit, that's why all flowering plants grow seeds and fruits ⁶ . I have had no more questions about it ⁷ . I have learnt which plant is seed, non-seed, flowering, or non-flowering plant ⁸ . I was saying that there was no flower on the plants such as populus before ⁹ , but I've learnt that the necessary organs that should be on a flower are reproductive organs and colourful leaves (petal and sepal) are supporting reproductive organs and protective forms. ¹⁰ So, there is no colourful form on populus' flower ¹¹ . And that's why I was saying there was no flower, but now I understand there is ¹² .	<ol style="list-style-type: none"> 1. Monitoring Change in Ideas 2. Second-Order Metaconceptual Awareness of Initial Ideas/ Mental Models 3. Second-Order Metaconceptual Awareness of What You Did Not Know 4. Second-Order Metaconceptual Awareness of Initial Ideas/ Mental Models 5. Second-Order Metaconceptual Awareness of What You Did Not Know and Metaconceptual Evaluation 6. Monitoring Change in Ideas 7. Monitoring of Understanding of an Idea 8. Monitoring Change in Ideas 9. Second-Order Metaconceptual Awareness of Initial Ideas/ Mental Models 10. Monitoring Change in Ideas 11. First-Order Metaconceptual Awareness of Mental Models and Ideas/Conceptions 12. Monitoring of Understanding of an Idea

He described plants that had no colourful leaves as plants having no flowers. He was aware that he previously categorised willow and populus as non-flowering plants. He also realised that he learnt some concepts that he did not know before. For example, he became aware that he did not know that a fruit was produced from flowers. He monitored the changes in his definition of flower and also how seeds and fruit are formed from different parts of ovary of the flower. He made his current ideas regarding the definition of flower explicit. He currently knows that *"the necessary organs which should be on a flower are reproductive organs, and colourful leaves (petal and sepal) are supporting reproductive organs and protective forms."* He monitored his understanding of the concepts he learnt by saying that he had *"no more questions about"* how flowering plants form seeds and fruit. He also understood that populus has flowers. He meta-conceptually evaluated his previous definition of flower by stating that *"we knew the definition of the flower wrong."* The metaconceptual processes that student I engaged in demonstrated the complex and interdependent nature of metaconceptual processes. Student I could engage in a wide range of different metaconceptual activities, which range from simpler processes, such as first-order metaconceptual processes, to more complex processes, such as metaconceptual evaluation.

Discussion and Conclusion

The aim of this research was to explore the nature of metaconceptual processes that were activated as pre-service biology teachers participated in different teaching activities. The journal entries written by different students showed that the classification of metaconceptual processes proposed by Yuruk (2005) and Yuruk et al. (2009) is a fruitful framework to categorise students' metacognitive processes that acted on the conceptions in their minds. Different types of metaconceptual processes defined previously by Yuruk (2005) became active when students were prompted to think about science concepts rather than to think with science concepts. This result reiterated the multifaceted character of metaconceptual processes which was previously reported by Yuruk (2005), Yuruk et al. (2009) and Kirbulut (2012). Some of the metaconceptual processes including first-order metaconceptual awareness of ontological presuppositions, first-order metaconceptual awareness of experiences, second-order metaconceptual awareness of contextual differences, second-order metaconceptual awareness of ontological presuppositions, second-order awareness of experiences, monitoring the consistency between existing idea and new experience which were previously defined by Yuruk (2005) were not observed in this study. This indicates that although metaconceptual processes are multifaceted, which means that there is a variety of metaconceptual processes, they are not a "all or none" phenomenon which was previously reported by Yuruk (2005). Different metaconceptual processes can be observed in different contexts, depending on the prompts used to activate them or the ability of the students.

Metaconceptual processes observed in this study were not limited to students' mental processes activated on a single concept, but rather they were observed in different topic areas. Although metaconceptual processes were observed in different

concepts, students' journal entries indicated that some concepts were more central for learning other concepts, such as the flower concept. A journal excerpt from student I was an example of how metaconceptual processes acting on the more central concepts helped him fix the gaps in his mind. For example, student I noticed how making a scientifically correct definition of a flower affected his categorisation of plants as flowering and non-flowering plants, and the classification of various examples from daily life as flowering and non-flowering plants.

The analysis of students' journals demonstrated that metaconceptual processes were activated in different forms ranging from simpler first-order metaconceptual awareness to a more sophisticated metaconceptual evaluation. The level of sophistication increases as the metaconceptual process requires more abstract thinking and as it requires student engagement in more than one type of metaconceptual process at the same time (Yuruk, 2005). The data collected in this study suggested that metaconceptual processes at different sophistication levels were in students' repertoire of learning behaviours when they were appropriately facilitated through instructional activities.

In terms of the abstractness of higher-order thinking, for example, metaconceptual evaluation requires more abstract and complex thinking compared to explicitly stating current or past ideas about a natural phenomenon or monitoring other people's ideas. As students engaged in metaconceptual evaluation, they did not only think about the idea, but they also thought about the validity, applications, and limitations of the ideas. For example, a student found her friends' idea that grass is a non-flowering plant unacceptable due to its inability to explain the formation of seeds in grass. This student did not simply monitor her friends' idea, but she was also able to think about the validity and limitations of this idea. Therefore, some metaconceptual processes may be more sophisticated or complex compared to others. However, student engagement in more sophisticated metaconceptual processes may require earlier engagement in less sophisticated activities. As in the previous example, metaconceptual evaluation of other people's ideas requires students to previously monitor the ideas coming from other sources. Similarly, second-order metaconceptual awareness of one's ideas about a certain concept requires students to previously engage in first-order metaconceptual awareness about that concept.

Some of the metaconceptual processes involve student engagement in more than one metaconceptual process at the same time. For example, in order to activate metaconceptual monitoring of the change in ideas, students must simultaneously activate first-order metaconceptual awareness and second-order metaconceptual awareness of the ideas, and compare and contrast their current and past ideas. Similarly, in order to activate monitoring the consistency between new ideas and existing ideas, students must monitor the ideas coming from different sources and become aware of their existing ideas.

Many researchers who have conducted studies in the field of conceptual change highlighted the role of metaconceptual activities in changing students' alternative

conceptions with scientific conceptions (Pintrich, Marx & Boyle, 1993; Vosniadou, 2003; Georghiades, 2004; Yuruk, 2005; Yuruk, 2007; diSessa, 2008; Yuruk et al., 2009; Kirbulut, 2012). Therefore, to improve students' understanding of science concepts, teachers should design instructional activities that explicitly stimulate students' engagement in metaconceptual processes. The findings of this study contribute to our understanding of the interdependent nature of metaconceptual processes, which should be taken into consideration by researchers and teachers in designing instructional activities that aim to activate students' metaconceptual processes. In designing this kind of instruction, teachers should first understand why and in what ways metaconceptual processes play a critical role in changing students' misconceptions. Then, in order to provide students with appropriate prompts, teachers should understand the multifaceted and interdependent nature of metaconceptual processes. Hence, in designing instructional activities, teachers should keep in their minds that activation of certain metaconceptual processes may require students to previously engage in different processes, or that student engagement of a sophisticated metaconceptual process may require the facilitation of different metaconceptual processes at the same time. Teachers should also find out central concept(s) that may affect the formation of other alternative conceptions. They should put extra effort in designing activities that help students to become aware of the differences between their existing ideas regarding the central concept and the scientific concepts. After students change their alternative conceptions regarding the central idea with the help of activation of metaconceptual processes, teachers should scaffold the formation of other related concepts.

The findings of this study give rise to several suggestions for future research. The relationship between students' metaconceptual processes and different variables, such as affective, motivational, and contextual factors, should be investigated. Quantitative or qualitative assessment tools to measure students' metaconceptual processes can be developed. Researchers or teachers could find different ways to facilitate metaconceptual processes through different tools in different learning environments, such as technologically-enhanced learning environments. The effect of amalgamating metaconceptual processes within different learning methods on students' conceptual understanding could be investigated. This study was conducted with pre-service science teachers. The ability of younger students in activating metaconceptual processes could be studied. The nature of metaconceptual processes activated by younger students could be examined. Finally, investigating the nature of metaconceptual processes activated in other topic areas, such as math and social studies concepts, could contribute to our understanding of these higher-order thinking processes.

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Biyoloji Öğretmen Adaylarının Üst kavramsal Faaliyetlerinin Doğasının İncelenmesi

Atıf:

- Yuruk, N., Selvi, M., & Yakisan, M. (2017). Investigation of the nature of metaconceptual processes of pre-service biology teachers. *Eurasian Journal of Educational Research*, 68, 121-150, <http://dx.doi.org/10.14689/ejer.2017.68.7>

Özet

Problem Durumu: Flavell (1979) tarafından ilk olarak ortaya atılmasından bu yana üstbilişin öğrenme sürecindeki önemi pek çok araştırmacı tarafından ortaya konulmuştur. Üstbilişle ilgili günümüze kadar ortaya konan tanım ve sınıflamalara bakıldığında üstbilişin üç temel bileşeninin olduğu görülmektedir: (a) biliş hakkında bilgi, (b) bilişsel faaliyetlerin kontrol edilmesi ve düzenlenmesi (Saçkes & Trundle, 2016).

1980'li yıllardan bu yana fen eğitimi ile ilgili yapılan çalışmaların büyük bir kısmında öğrencilerin anlamlı öğrenmesini engelleyen alternatif kavramlara odaklanıldığı görülmektedir. Alternatif kavramların varlığı ve değişime gösterdiği direnç gerek fen eğitimi gerekse bilişsel psikoloji alanında çalışan pek çok araştırmacının ilgisini

çekerek kavramsal değişimle ve alternatif kavramların oluşumu ile ilgili farklı kuramsal çerçeveler oluşturmalarına neden olmuştur. Bunlardan biri de kavramsal değişim modelidir. Bu model kavramsal değişimin gerçekleşmesi için gerekli olan şartları ortaya koymakta ve bireyin kavram ekolojisinde yer alan öğelerin (inançlar, analogiler, metaforlar vb.) kavramsal değişimdeki rolüne değinmektedir (Posner vd., 1982). Bilişsel psikoloji alanında çalışan farklı araştırmacılar ise alternatif kavramların oluşumunda bireyin epistemolojik inançları (Vosniadou, 1994), ontolojik varsayımları (Chi vd., 1994) ve bağlama bağlı oluşturulan bilgi parçacıklarının (diSessa, 1993) önemine vurgu yapmışlardır. Ortaya konan kuramsal çerçevelerde farklılıklar olmasına rağmen araştırmacılar, kavramsal değişimin basitçe alternatif kavramın yerini bilimsel kavrama bırakması olmadığını, kavramsal değişimin gerçekleşebilmesi için bireyin mevcut kavramının sınırlılıklarını fark etmesi, mevcut kavramla yeni kavramı çok yönlü karşılaştırarak değerlendirmesi gerektiğini savunmaktadırlar. Bu süreçler bireylerin üstbilişsel olarak aktif olmasını gerektiren süreçlerdir.

Kavramsal değişim sürecinde üstbilişsel faaliyetlerin önemi pek çok araştırmacı tarafından vurgulanmıştır (Georghiadis, 2004; Vosniadou, 2003; Yürük et al., 2009). Üstbiliş genel bir ifade ile bireyin düşünme faaliyetleri üzerinde düşünmesi ya da bireyin bilişsel faaliyetleri hakkındaki bilişsel faaliyetleri olarak tanımlanmaktadır (Flavell, 1979; Rickey & Stacy, 2000). Ancak üstbiliş kavramsal değişim sürecini açıklamada geniş bir kavram olarak kalmaktadır. Yürük (2005) ve Yürük et al. (2009) kavramsal düzeyde gerçekleşen üstbilişsel faaliyetleri üstkavramsal faaliyetler olarak tanımlamışlar ve bu faaliyetleri; üstkavramsal farkındalık, üstkavramsal izleme ve üstkavramsal değerlendirme olarak üç kategoriye ayırmışlardır. Üstkavramsal farkındalık, bireyin mevcut ya da daha önce sahip olduğu kavramsal ekolojisinin öğeleri ya da neyi bilmediğinin farkında olması olarak tanımlanmıştır. Üstkavramsal izleme faaliyeti, bireyin devam eden bilişsel süreci veya bilişsel durumu hakkında bilgi üretmek için aktif olan süreçleri içerir. Üstkavramsal değerlendirme faaliyeti de bireyin var olan ya da yeni fikrin doğruluğu, akla yatkınlığı ve kullanılabilirliği hakkında yargıya varmasını içerir.

Araştırmanın Amacı: Çalışmanın amacı biyoloji öğretmen adaylarında üstkavramsal öğretim etkinlikleri sırasında aktif hale gelen üstkavramsal faaliyetlerin niteliğini ortaya koymaktır.

Araştırmanın Yöntemi: Araştırma bir durum çalışmasıdır. Biyoloji öğretmen adaylarının tohumlu bitkilerle ilgili sahip oldukları alternatif kavramların doğru kabul edilenlerle değişmesini sağlamak için 32 biyoloji öğretmenliği 2. sınıf öğrencisinin üstkavramsal faaliyetlerini aktif hale getirecek öğretim etkinlikleri uygulanmıştır. Üstkavramsal faaliyetlerin öğrencilerde aktif hale getirilmesini sağlamak amacıyla poster hazırlama, günlük yazma, kavram haritası oluşturma, sınıf ve grup tartışmaları gibi farklı öğretim etkinliklerinden faydalanılmıştır. Bu etkinlikler 10 haftalık bir süreçte uygulanmıştır. 32 öğrenci arasından etkinlikler esnasında zihinlerinde fazla sayıda ve türde üstkavramsal faaliyetlerin aktif olduğu ve bu faaliyetleri günlüklerinde açık şekilde ifade eden beş öğrenci durum çalışması için seçilmiştir. Üstkavramsal faaliyetleri belirlemek amacıyla veri kaynağı olarak bu beş öğrenci tarafından öğretim süreci öncesinde, sırasında ve sonrasında yazılan günlükler kullanılmıştır. Günlük yazma etkinliği farklı üstkavramsal faaliyetleri aktif

hale getirmek amacıyla öğretim süreci boyunca sıklıkla uygulanmıştır. Öğretmen adaylarına verilen günlük yönergeleri ile öğretmen adaylarının kendi mevcut kavramları ve fikirlerinin arkasında yatan sebepler hakkında düşünmeleri, karşı karşıya kaldıkları farklı fikirleri anlamalarını izlemeleri, doğrulukları hakkında yargıya varmaları, fikirlerinin sınırlılıklarını fark etmeleri, mevcut fikirleri ve farklı kaynaklardan gelen yeni fikirlerin tutarlılığını ve fikirlerindeki değişimi izlemeleri sağlanmaya çalışılmıştır. Bu özellikleri ile günlükler diğer öğretim etkinlikleri esnasında aktif hale gelen üstkavramsal faaliyetleri yansıtmaktadır. Durum çalışması için seçilen öğrencilerin günlükleri içerik analizi yapılarak kodlanmıştır. Öğrencilerde aktif hale gelen üstkavramsal faaliyetler; üstkavramsal farkındalık, üstkavramsal izleme ve üstkavramsal değerlendirme kategorileri ve konu içeriği açısından sınıflandırılmıştır.

Araştırmanın Bulguları ve Sonuçları: Elde edilen bulgular daha önce Yürük (2005) tarafından ortaya konan üstkavramsal faaliyetlerin pek çoğunun bu çalışmada da öğrencilerde aktif olduğunu göstermiştir. Öğrencilerin günlükleri, tohumlu bitkiler başlığı altında yer alan farklı konularda, farklı çeşitte üstkavramsal faaliyetlerin aktif hale geldiğini ortaya koymaktadır. Bu faaliyetlerin bazılarının birbirine bağımlı olduğu gözlenmiştir. Örneğin bir kavramla ilgili ikinci dereceden farkındalığın gerçekleşebilmesi için bireyde geçmişte o kavramla ilgili birinci dereceden farkındalığın aktif olması gerekir. Bulgular bazı üstkavramsal faaliyetlerin birden fazla üstkavramsal faaliyeti içerebileceğine de işaret etmektedir. Örneğin bir kavramla ilgili kavramlardaki değişimin izlenmesi, o kavramla ilgili birinci ve ikinci dereceden farkındalığı içermektedir. Günlüklerden elde edilen bir başka bulgu ise üstkavramsal faaliyetlerin basitçe birinci dereceden farkındalık olabileceği gibi daha soyut ve üst düzey düşünmeyi gerektiren üstkavramsal değerlendirme de olabileceğidir.

Araştırmanın Önerileri: Tüm bu bulgulardan yola çıkılarak üstkavramsal faaliyetleri aktif hale getiren öğretim etkinlikleri tasarlandığında bu faaliyetlerin çok yönlü ve birbirine bağımlı yapısı dikkate alınmalıdır. Üstkavramsal faaliyetleri aktif hale geçirecek öğretim etkinlikleri tasarlanırken, konuyla ilgili merkezde olan ve diğer alternatif kavramların oluşmasında rol oynayabilecek kavram ya da kavramların saptanmasına ve etkinliklerin özellikle bu kavram ve bununla ilgili bilimsel kavram arasındaki farklılıkların fark edilmesini sağlayacak şekilde düzenlenmesine özen gösterilmelidir.

Anahtar Kelimeler: Üstkavramsal faaliyetler, tohumlu bitkiler, kavramsal değişim, biyoloji öğretmen adayları.



Five-Factor Personality Traits as Predictor of Career Maturity

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ABSTRACT

Purpose: This study aims to determine the predictive strength of personality traits based on the five-factor theory on the level of career maturity

Research Methods: The sample of the study included a total of 429 high school students, 248 females (57.8%) and 181 males (42.2%). The study utilized the "Career Maturity Scale" to determine the students' career maturity levels. To measure the personality traits of the students, the "Five-Factor Personality Traits Test" was used.

Findings: Results showed that the personality trait variables included in the model altogether significantly predicted career maturity ($R = .35$, $R^2 = .12$, $p < .05$). It has been observed that, in the model, independent variables explained 12% of the variance in career maturity. When the contribution of each independent variable to the model was analysed, the highest contribution came from neuroticism ($\beta = -.158$), followed by extraversion ($\beta = .148$), openness ($\beta = .109$), agreeableness ($\beta = .090$), and conscientiousness ($\beta = .083$).

Implications for Research and Practice: Findings of the study demonstrated that high school students should be encouraged to interact with people around them and access sources of information easily. Furthermore, their social skills should be enhanced to increase their career maturity levels. The ways to access resources to learn about various occupations, such as the Internet, magazines, and books, should be planned and presented for students, especially those with introverted and anxious personality traits.

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Introduction

In Turkey, students begin to determine their career choices during high school. Students attend different types of high schools with distinct curricula aimed at various occupations (e.g. regular, Anatolian, science, technical, health, vocational, religious vocational). However, it is rather difficult to argue that students make these choices based on factors such as their skills, interests, values, and personality traits. In Turkey, factors such as the values endowed to occupations and employment opportunities shape students' choices of high schools. However, students should attain sufficient career maturity to make a healthy career choice. Determining the effects of the personality traits of high school students on career maturity would help to better serve career counselling services and guidance applications for high school students. The career that one selects affects his lifestyle, values, and status in life (Brown, 2003; Kuzgun, 2000). An individual who has selected a suitable profession has a wonderful opportunity to fulfil his psychological needs in life. In that respect, for individuals, selecting appropriate careers also helps to protect their mental health (Binbasioglu, 1983; Brown, 2003; Field, 2008). One of the critical periods for career choice is adolescence. Super and Overstreet (1960) stated that adolescents between the ages of 14 and 18 are in the research phase of career choice. It is expected that individuals of this age group should have defined their field of study and to have formed their decisions of career choices. Individuals should, in this period, shape their professional goals in line with their personality traits and inquire about academic education and certification programs required for certain professions.

To make a correct career choice, certain basic competencies are needed. The concept that defines this competency is career maturity. Super (1977) defined the concept of career maturity as the ability to plan for career choices, raise awareness about different careers, and take responsibility to make a career choice. According to Brown (2003), career maturity is a set of emotional and cognitive traits, including skills to handle situations concerning career choices. When the definitions of career maturity are examined, it can be defined, in general terms, as being informed about various careers and prepared to make appropriate choices for oneself that are coherent with that information (Powell & Luzzo, 1998; Savickas, 1984; Seligman, 1980). Career maturity reflects the readiness for the process of making a career choice. Zunker (2006) stated that certain individuals are not ready to make career choices, and their choices would not be appropriate because of their low career maturity levels. For an individual to make a career choice, that person should have gained a certain level of career maturity as a developmental task. An individual with this awareness and readiness is believed to be capable of formulating more appropriate choices. Research has been executed about the effects of career maturity on one's life. Findings of such research have demonstrated that individuals with higher levels of career maturity make healthier career choices (Patton, Creed, & Muller, 2002) and experience less career uncertainty (Creed & Patton, 2002; Patton & Creed, 2007). Career maturity is affected by many factors: gender (Akbalik, 1991; Busacca & Taber, 2002; Patton & Creed, 2001; Yon, Choi, & Gog, 2012), locus of control (Dhillon & Kaur, 2005), self-concept (Dhillon & Kaur, 2005; Gulbahce, 2007),

academic achievement (Kelly & Colangelo, 1990), work experience (Flouri & Buchanan, 2002), decision-making styles (Blustein, 1987), culture (Patton, Watson, & Creed, 2004), professional value (Post-Kammer, 1987), parental attachment (Choi, Hutchison, Lemberger, & Pope, 2012), generation (Harlow & Bowman, 2016), and socio-economic standing (Yon et al., 2012) are among these factors.

Another factor one should take into consideration during career choice is personality traits. Personality is a factor in determining how an individual would behave under various situations. In that respect, personality affects an individual's career decisions, career choice, job performance, and satisfaction (Crant, 2006). Personality is defined as intellectual, affective, and behavioural differences that distinguish one individual from others (D. H. Hockenbury & S. E. Hockenbury, 2010). Burger (2004) defined personality as consistent autogenous behaviours of an individual. Several approaches were suggested for the elaboration and definition of personality in the literature. One of these approaches is the trait approach. The five-factor personality structure is a generally accepted approach, although there are disagreements about its structuring based on certain basic traits (Goldberg, 1990). Adjectives commonly used in daily language to define personality traits are used to determine five-factor personality traits (Goldberg, 1981; Salgado, Viswesvaran, & Ones, 2001; Somer, 1998). The five-factor personality traits are preferred among several personality trait models due to their consistency in defining personality (Bacanli, Ilhan, & Aslan, 2009). In the five-factor model, personality traits are represented as extraversion, neuroticism, agreeableness, conscientiousness, and openness to experience dimensions (Caligiuri, 2000; Costa & McCrae, 1995; Somer & Goldberg, 1999). Individuals with extroverted personalities are characterized with positive emotions, entrepreneurial skills, and strong social relations. These individuals are open to other people from diverse cultural backgrounds and demonstrate elevated levels of socialisation. Individuals with the personality traits of the neuroticism dimension are easily affected by situations causing stress. Since their ability to deal with difficulties is weak, they are emotionally reactive. Due to their frequent emotional changes, they often experience depression, anxiety, and anger. Individuals with agreeableness personality traits have polite, affectionate manners and prefer to work in teams. Individuals with the traits of the conscientiousness dimension are attentive in their behaviour and conscientious, have high inner discipline, display consistent behaviour, and have a high sense of responsibility. Finally, individuals with openness to experience personality traits are curious, versatile thinkers; they are creative, sensitive to changes, imaginative, open to innovations, and risk-taking individuals (Caligiuri, 2000; Costa & McCrae, 1995; Gosling, Rentrow, & Swan, 2003; John & Srivastava, 1999; McCrae & Costa, 2006; Moody, 2007; Roccas, Sagiv, Schwartz, & Knafo, 2002; Watson & Clark, 1992). Studies demonstrate that personality affects career maturity (Liu, Peng, Mao, & Wong, 2016; Lundberg, 1995), career decidedness (Lounsbury, Hutchens, & Loveland, 2005), career success (Seibert & Kraimer, 2001), career performance (Barrick & Mount, 1991; Yelboga, 2006), career explorations (Nauta, 2007), and career satisfaction (Lounsbury, Park, Sundstrom, Williamson, & Pemberton, 2004). Since the above-mentioned five-factor classification is widely accepted as an adequate classification of personality traits (McCrae & Costa, 2006;

Paunonen, Jackson, Forsterling, & Trezebinski, 1992; Somer, 1998), the personality traits of high school students in this study are based on the five-factor classification.

Studies conducted on career maturity in Turkey (Akbalik, 1991; Gulbahce, 2007), usually entail determination of the students' career maturity levels and analysing them with respect to several variables. However, these studies did not research the effects of personality traits on career maturity levels. Thus, it is believed that the present study would contribute to the literature on the determination of career maturity levels of high school students with different personality traits. The findings of the study would help school guidance counsellors to determine various levels of counselling that students with different personality traits would need concerning their career choices.

This study aims to examine the relationship between the personality traits of high school students based on the five-factor theory (i.e. extraversion, neuroticism, agreeableness, conscientiousness, and openness to experience) and their levels of career maturity. Data collected from 429 high school students were assessed to answer the following questions:

1. What is the level of correlation between the personality traits of high school students and their career maturity?
2. To what extent do the personality traits of high school students predict their career maturity?

Method

Research Design

This study is a quantitative research that uses the associational survey method. This survey design is used to describe the dispositions, attitude, or views quantitatively or numerically in a population through studies conducted for a sample selected from that population (Creswell, 2014). To benefit from the advantages of the survey design, e.g. economy and rapid data collection, Career Maturity and Five-factor Personality Traits scales were used as data collection tools. Data was collected from high school students using the single-session group application method (Fowler, 2009). The relationship between the dependent variable of the study, career maturity, and the independent variable of the study, the five-factor personality traits, was analysed using a multi-linear regression analysis.

Research Sample

The milieu of the study, Malatya province, is a metropolitan city in the Eastern Anatolia region in Turkey with a population of over 740,600. The population of the study consisted of 15,119 high school students in Yesilyurt, the central district of Malatya province. To select the study sample, the nonprobabilistic convenience sampling method (Creswell, 2014) was utilised due to the accessibility and convenience of the participants. For the sample of the study, a total of 429 high

school students were selected, 248 females (58%) and 181 males (42%). Of the students in the sample, 39 (9%) were in 9th grade, 128 (30%) were in 10th grade, and 262 (61%) were in 11th grade during the study.

Research Instruments

Career Maturity Scale (CMS): Originally developed by Crites (1978) to determine the career maturity levels of high school students, CMS was adapted to Turkish by Kuzgun and Bacanlı (1996). The scale, developed as a 5-point Likert rating scale (*not applicable at all to totally applicable to me*), contains 40 items. Out of the 40 items, 19 items reflect favourable attitudes and behaviours regarding career maturity (e.g. "I search for resource materials to know better about different professions."), while 21 items reflect unfavourable attitudes and behaviours (e.g. "I think my elders know which profession is appropriate for me better"). A high score obtained from the scale shows an elevated level of career maturity. Cronbach's Alpha coefficient of the scale was estimated to be .89. Furthermore, a significant positive correlation was found in validity studies for the scale between the scores the students obtained from the scale and their university entrance exam scores (.39).

Five-Factor Personality Traits Scale (FFPT): FFPT was developed by John, Donahue, and Kentle (1991) to obtain a five-factor personality scale, which is easy to apply, short, suitable, and applicable in different languages and cultures. The assessment is a 5-point Likert type scale (*I do not agree at all to I completely agree*) with 44 items, which includes the following categories: extraversion, measured with eight items (e.g. "I consider myself talkative"); agreeableness, measured with nine items (e.g. "I consider myself to be a forgiving person"); conscientiousness, measured with nine items (e.g. "I consider myself someone who does all his duties completely"); neuroticism, measured with eight items (e.g. "I consider myself depressed and melancholic"); and openness to experience, measured with 10 items (e.g. "I consider myself to have a high imagination"). Sumer and Sumer conducted the Turkish adaptation of the scale within an international project (Schmitt, Allik, McCrae, & Benet-Martinez, 2007).

Data Analysis

In line with the purpose of the study, a correlation analysis was executed to determine the relationship between the variables, and a multiple regression analysis was implemented to examine the predictive strength of each independent variable on career maturity. The data set was found to meet the assumptions of regression analysis after examining the assumption criteria required by the random effects model in multiple regression analysis: multivariate normal distribution of variables and random selection of the participants within the population. Prior to the implementation of the multiple regression analysis, Mahalanobis and Durbin Watson criteria were examined to ensure that the data was distributed normally, which is a necessary theoretical criterion in multiple regression analysis. The Mahalanobis value was also found to be lower than 25 and the Durbin Watson value was found to be between 1.5 and 2.5, which suggest that the data was distributed normally. It was also observed that the correlation coefficients between the variables that entered the model were below .70, suggesting that there were no multicollinearity problems. It

has been noted that the number of participants in regression analysis should be $50+8k$ (k =number of variables) times each independent variable (Field, 2009).

Results

The intercorrelations between career maturity and personality types are provided in Table 1.

Table 1.

Correlation Coefficients Between Variables

	M	SD	1	2	3	4	5	6
1. Career maturity	146.90	19.79	1					
2. Extraversion	3.45	.79	.21**	1				
3. Conscientiousness	3.62	.57	.18**	-.01	1			
4. Openness	3.49	.60	.19**	.30**	.19**	1		
5. Agreeableness	3.68	.53	.19**	.07	.40**	.11*	1	
6. Neuroticism	2.78	.71	-.23**	-.15**	-.25**	-.06	-.29**	1

(*)= $p < 0.05$; (**)= $p < 0.01$

When the intercorrelations between career maturity and personality types in Table 1 are examined, the correlation values are seen to range between $-.29$ and $.40$. The findings reflect that there are statistically significant positive correlations between career maturity and extraversion ($r=.21$, $p < .05$), agreeableness ($r=.19$, $p < .05$), openness to experience ($r=.19$, $p < .05$), and conscientiousness ($r=.18$, $p < .05$). There is a negative significant relationship between career maturity and neuroticism ($r=-.23$, $p < .05$).

Table 2.

Multiple Regression Analysis results on prediction of Five Factor Personality Traits for Career Maturity

Predicted Variable	Predicting Variables	B	SE	β	t	p
Career Maturity	Constant	111.385	10.836		10.279	.000
	Extraversion	3.702	1.215	.148	3.048	.002
	Conscientiousness	2.859	1.762	.083	1.623	.105
	Openness	3.566	1.596	.109	2.235	.026
	Agreeableness	3.305	1.866	.090	1.772	.077
	Neuroticism	-4.392	1.356	-.158	-3.238	.001
Multiple R=.347. $R^2 = .12$; $F(4,424) = 11.560$, $p < .05$						

Table 2 demonstrates that independent variables included in the model altogether significantly predict career maturity ($R = .35$, $R^2 = .12$, $F(4,424) = 11.56$, $p < .05$). It has been observed that, in the model, the independent variables explained 12% of the variance in career maturity. When the contribution of each independent variable was analysed, the highest contribution was observed to come from neuroticism ($\beta = -.158$, $p < .05$), followed by extraversion ($\beta = .148$, $p < .05$), openness to experience ($\beta = .109$, $p < .05$), agreeableness ($\beta = .090$, $p < .05$), and conscientiousness ($\beta = .083$). However, the contribution of conscientiousness and agreeableness variables to the model was found insignificant.

Discussion and Conclusion

Findings of the study demonstrated that extraversion, openness to experience, and neuroticism among five-factor personality traits significantly predict career maturity. A positive relationship was observed between extroverted personality traits and career maturity. Career maturity entails individuals making inquiries about careers and obtaining this information by communicating with others, if unsuccessful in their initial inquiries. Extroverted individuals are sociable and initiative (Brislin & Kevin, 2006; Gosling et al., 2003; John & Srivastava, 1999). Because extroverted individuals have high communication skills (Kail & Cavanaugh, 2008), it is easy for them to receive information and comments from various individuals about different professions (Zel, 2001). Thus, it would be expected that individuals with extroverted personality traits have higher career maturities. Parallel to the findings of this study, certain other studies have demonstrated that extroverted individuals have elevated levels of career maturity (Savickas, Briddick & Watkins, 2002), career satisfaction (Seibert & Kraimer, 2001), and career decisiveness (Lounsbury et al., 2005).

Another finding of the study is that openness to experience personality traits positively predict career maturity. Individuals with an open personality are open to information derived from the external world. Individuals with these personality traits aim to renew, change, and explore and discover things, and they satisfy this need usually via reading and travelling activities (McCrae, 1994). Nauta (2007) stated that individuals with openness personality types are more aware of and in need of information on career choices than others. Career maturity also necessitates reading books to learn more about careers, researching one's own skills and career values, and a dynamic research process. In that respect, the investigative and exploratory character of the open personality entails exploration and investigation of careers and the business world, as well. Researching, assessing, and relating careers to one's own skills increase the career maturity levels of individuals with openness personality traits.

Another finding of this study is that neurotic personality traits negatively predict career maturity. Neurotic personality traits involve several negative characteristics, such as being introverted, insecure, and overreacting under stress (Gosling et al., 2003; John & Srivastava, 1999; Weiten, 2010). Neurotic personality types tend to consider problems they face as frightful situations that cause more stress, instead of

viewing them as a challenge in the learning process (David & Suls, 1999). Since individuals with these personality traits are insecure and usually introverted people, they are not highly motivated to pursue developments and features about careers (Kaplan & Brown, 1987). Decision-making and teamwork skills are low in neurotic types, which prevents such individuals from enjoying their jobs (Crant, 2006; Seibert & Kraimer, 2001). Instead of noticing novelties around oneself and harmonising with the environment, neurotic personality types become more introverted, scared, and tend to pull back, which are factors that inversely affect career maturity. Negative traits of neurotic personality types cause them to experience career indecision and can decrease their job performance (Yelboga, 2006).

The findings of this study, in which the role of personality traits of high school students on predicting their career maturity levels were analysed, demonstrated that extraversion, openness to experience, and neuroticism personality traits significantly predict the level of career maturity. While extraversion and openness personality traits predict career maturity positively, neuroticism personality traits predict career maturity in a negative way. It has been observed that individuals who can interact easily with others and who are social have higher career maturity levels. Likewise, having an open personality type, i.e. openness to improvement, questioning oneself, and having an inquiring personality, predicts career maturity positively and significantly. On the contrary, neurotic personality types lack self-esteem, are introverted, and regard change as a threat to his being, which predicts career maturity negatively and significantly. Findings of the study demonstrated that high school students should be encouraged to interact with people around them and easily access sources of information. In addition, their social skills should be enhanced in order to increase their career maturity levels. The ways to access resources to learn about various occupations, such as the Internet, magazines, and books, should be planned and presented for students, especially those with introverted and anxious personality traits. While individuals with extroverted and open personalities could access information about their traits and the requirements of careers using their communications skills and motivation to learn, the students with neurotic personality traits do not possess the same strong characteristics. Thus, neurotic types should be helped by planning their access to information regarding the process of career choice without endangering the boundaries of their personality traits, and without causing expectations for them to have excessive social contact. Furthermore, certain suggestions could be proposed for researchers interested in the subject within the findings and limitations of this study. Primarily, it would be rewarding to test the validity of the findings acquired by the study on different sample groups. The findings of this study reflect an indirect observation achieved through the use of scales. Further detailed and qualitative studies could be conducted to examine the processes high school students with different personality types experience, the difficulties they face, and how they deal with these difficulties.

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Özet

Problem Durumu: Türkiye’de öğrencilerin meslek tercihlerinin belirginleşmeye başlaması lise döneminde olmaktadır. Ancak öğrencilerin bu tercihlerini kendi yetenek, ilgi, değer ve kişilik özellikleri gibi temel faktörleri dikkate alarak yaptıklarını söylemek oldukça güçtür. Türkiye’de mesleklere yüklenen değerler, iş bulma olanakları gibi faktörler nedeni ile öğrencilerin lise tercihleri biçimlenmektedir. Öğrencilerin meslek seçimlerini daha sağlıklı yapabilmeleri için yeterli mesleki olgunluğa sahip olmaları gerekir. Lise öğrencilerinin kişilik özelliklerinin mesleki olgunluk düzeyi üzerindeki etkisinin belirlenmesi farklı kişilik yapılarına sahip lise öğrencileri için mesleki rehberlik ve danışmanlık uygulamalarına katkı sağlayacaktır. Meslek seçiminin doğru yapılabilmesi için bazı temel yetkinliklere ihtiyaç vardır. Bu yetkinliği ifade eden kavram mesleki olgunluk kavramıdır. Mesleki olgunluk kavramı genel olarak meslek seçimi ile ilgili planlar yapabilme, mesleklere ilişkin farkındalık sahibi olma ve meslek seçimi sorumluluğunu üstlenebilme olarak tanımlanmaktadır. Mesleki olgunluk üzerine yapılan çalışmalarda kişilik özelliklerinin etkisinin incelendiği araştırma sayısı çok az sayıdadır.

Bireyin meslek seçiminde dikkate alınması gereken özelliklerinden biri de kişilik özellikleridir. Kişilik, bir bireyin değişik durumlarda nasıl davranacağını belirlemede etkilidir. Bu açıdan bakıldığında kişilik, bireyin mesleki kararını, meslek seçimini, iş performansını ve mesleki doyumunu etkiler. Kişilik, bireyi diğerlerinden ayıran düşünsel, duyuşsal ve davranışsal farklılıklar olarak tanımlanmaktadır. Kişiliğin açıklanması ve tanımlanması ile ilgili literatürde birçok yaklaşım öne sürülmektedir. Bu yaklaşımlardan biri de özellik yaklaşımıdır. Beş

faktör kişilik yapısı temel bazı özellikler çerçevesinde yapılandırılması konusunda görüş ayrılıkları içerse de genel kabul gören bir yapı olarak değerlendirilebilir. Beş faktör modelinde kişilik özellikleri dışadönüklük, nevrozizm, uyumluluk, sorumluluk ve açıklık boyutlarında değerlendirilmektedir. Dışadönük kişilik tipindeki bireyler, pozitif duygulara sahip girişimci ve sosyal ilişkileri güçlüdür. Bu bireyler farklı kültürden olan kişilere açık ve sosyal uyum düzeyleri yüksektir. Nevrotizm boyutunun kişilik özelliklerine sahip olan bireyler stres içeren durumlarda hemen etkilenirler. Zorluklarla baş etme becerileri düşük olduğundan duygusal anlamda tepkili ve reaktifler. Yaşadıkları duygu değişimleri nedeniyle sıklıkla depresyon, anksiyete ve öfke yaşarlar. Uyumluluk kişilik özelliklerine sahip olan bireyler, sosyal ilişkilerinden nazik, sevecen, iş birliği halinde çalışmayı tercih eden bir kişilik yapısı sahiptirler. Sorumluluk boyutunun kişilik özelliklerine sahip olan kişiler davranışlarında dikkatli, iç disiplini yüksek ve benzer davranışlar sergileme konusunda tutarlı, özenli ve sorumluluk düzeyi yüksek özellikler gösterirler. Son olarak açıklık kişilik özelliğine sahip bireyler meraklı, çok yönlü düşünebilen, yaratıcı, çevredeki değişimlere duyarlı, hayal gücü yüksek, yeniliklere açık ve risk alabilen kişilerdir. Bu araştırma farklı kişilik özelliklerine sahip lise öğrencilerinin mesleki olgunluk düzeylerinin belirlenmesinde literatüre katkı sağlayacağı düşünülmektedir. Bu araştırma sonuçları okullarda çalışan okul rehber öğretmenlerinin hangi kişilik özelliklerine sahip öğrencilerin meslek seçimi ile ilgili daha fazla yardıma ihtiyaç duyduklarını belirlemeyi kolaylaştıracaktır.

Araştırmanın Amacı: Bu tarama çalışmasının amacı lise öğrencilerinin beş faktör kuramına dayalı kişilik özellikleri (dışadönüklük, nevrozizm, uyumluluk, sorumluluk ve açıklık) ile mesleki olgunluk düzeyleri arasındaki ilişkiyi incelemektir. Aşağıda yer alan soruları cevaplamak için 429 lise öğrencisinden sağlanan veriler kullanılmıştır.

- Lise öğrencilerinin kişilik özellikleri ile mesleki olgunluk düzeyleri arasındaki korelasyon düzeyi nedir?
- Lise öğrencilerinin kişilik özellikleri mesleki olgunluklarını ne düzeyde yordamaktadır?

Araştırmanın Yöntemi: Bu araştırma ilişkisel tarama modelinde, nicel bir araştırmadır. Araştırmanın evreninin Malatya ili Yeşilyurt merkez ilçesinde bulunan 15119 lise öğrencileri oluşturmaktadır. Araştırmanın örneklemini 248'i kız (58%) ve 181'i erkek (42%) erkek toplam 429 lise öğrencisinden oluşmaktadır. Örneklemin 39'u (9%) dokuzuncu sınıf, 128'i (%30) 10.sınıf ve 262'si (%61) 11.sınıf öğrencilerinden oluşmaktadır. Araştırma kapsamında öğrencilerin mesleki olgunluk düzeylerini ölçmek için "Mesleki Olgunluk Ölçeği" kullanılmıştır. Öğrencilerin kişilik özelliklerinin ölçülmesinde ise, "Beş Faktör Kişilik Özellikleri Testi" kullanılmıştır. Araştırmanın amacı doğrultusunda değişkenler arasındaki ilişkileri belirlemek için korelasyon analizi; bağımsız değişkenlerin her birinin tek başına mesleki olgunluk üzerindeki yordayıcı etkisini incelemek için çoklu regresyon analizi kullanılmıştır.

Araştırmanın Bulguları: Mesleki olgunluk ile kişilik tipleri arasındaki ikili korelasyonlar değerleri -.29 ile .40 arasında değişmektedir. Mesleki olgunluk ile

dışadönüklük ($r=.21, p<.05$), uyumluluk ($r=.19, p<.05$), açıklık ($r=.19, p<.05$) ve sorumluluk ($r=.18, p<.05$) arasında anlamlı pozitif ilişki vardır. Mesleki olgunluk ile nevrozizm ($r=-.23, p<.05$) arasında ise anlamlı negatif ilişki vardır. Regresyon analizinde modele sokulan bağımsız değişkenlerin (dışadönüklük, nevrozizm, uyumluluk, sorumluluk ve açıklık) mesleki olgunluğu anlamlı düzeyde yordadığı görülmektedir ($R^2 =.12, F(4,424)= 11.560, p <.05$). Bağımsız değişkenlerin modelin %12'sini açıkladığı görülmüştür. Bağımsız değişkenlerin modele katkıları değerlendirildiğinde en önemli katkının nevrozizm ($\beta=-.158, p<.05$) bunu sırasıyla dışadönüklük ($\beta=.148, p<.05$), açıklık ($\beta=.109, p<.05$), uyumluluk ($\beta=.090, p<.05$) ve sorumluluk ($\beta=.083$) geldiği anlaşılmaktadır.

Araştırmanın Sonuçları ve Önerileri: Araştırma sonucunda beş faktör kişilik özelliklerinden dışadönüklük, açıklık, nevrozizmin mesleki olgunluğu anlamlı olarak yordadığı görülmüştür. Dışadönüklük kişilik özelliği ile açıklık kişilik özelliği mesleki olgunluğu pozitif yönde yordarken, nevrozizm kişilik özelliği mesleki olgunluğu negatif yönde yordamaktadır. Çevreleri ile kolaylıkla iletişim kurabilen dışarıya açık ve sosyal olan dışadönük kişilik özelliğine sahip bireylerin mesleki olgunluk düzeyinin yüksek olduğu görülmektedir. Aynı şekilde gelişmelere açık, kendi ile ilgili sorgulamaları rahatlıkla yapabilen ve araştırmacı bir kişilik özelliğine sahip olan açıklık kişilik tipinde olmak mesleki olgunluğu pozitif yönde anlamlı bir şekilde yordamaktadır. Bunların aksine kendine güvensiz, içe kapanık ve değişimi kendi için tehdit olarak gören nevrozik kişilik tipinde olmak mesleki olgunluğu negatif yönde anlamlı bir şekilde yordamaktadır. Elde edilen bulgular genel olarak değerlendirildiğinde lise öğrencilerinin mesleki olgunluk düzeylerinin yükselmesi için çevreleri ile iletişim kurmaları, sosyal becerilerinin artırılması ve bilgi kaynaklarına rahatlıkla ulaşmaları için cesaretlendirilmeleri gerekmektedir. Özellikle içe kapanık, kaygılı kişilik özelliklerine sahip olan öğrencilerin meslekler ile ilgili bilgi edinmelerinde internet, dergi ve kitap gibi kaynaklara nasıl ulaşacakları açık bir şekilde planlanarak sunulmalıdır. Dışadönük ve açıklık kişilik tipindeki bireyler kendi özellikleri ve mesleklerin gereklilikleri ile ilgili bilgilere iletişim becerileri ve öğrenme motivasyonları ile ulaşırken nevrozik kişilik özelliğine sahip öğrencileri aynı güçlü donanıma sahip değillerdir. Bu nedenle nevrozik tiplerin söz konusu meslek seçimi süreci ile ilgili bilgilere kendi kişilik özelliklerinin sınırlarını tehdit etmeyecek yani sosyal ilişki kurmaları için yüksek beklenti oluşturulmayacak şekilde planlamalar yapılarak yardım edilmelidir. Ayrıca, konuyla ilgilenen araştırmacılara yönelik olarak, yapılan araştırma sonucunda elde edilen bulgular ve sınırlılıkları çerçevesinde çeşitli önerilerde bulunulabilir. Öncelikle araştırma kapsamında elde edilen bulguların geçerlilikleri farklı örneklem grupları üzerinde sınanması faydalı olacaktır. Araştırma kapsamında elde edilen bulgular, ölçekler aracılığıyla elde edilmiş dolaylı bir gözlemi yansıtmaktadır. Konu ile ilgili nitel araştırmalar yapılarak farklı kişilik tiplerine sahip lise öğrencilerinin meslek seçimi süreci ile ilgili yaşadıkları süreç ve karşılaştıkları güçlüklerle nasıl baş ettikleri ile ilgili daha detaylı bir araştırma yapılabilir.

Anahtar Kelimeler: Beş faktör, mesleki olgunluk, kişilik, meslek seçimi, lise.



Relationship between Communication Competence and Conflict Management Styles of School Principals

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ABSTRACT

Purpose: Determining the relationship between communication competence and conflict management styles of school principals, according to teacher perceptions, is important for school principals to effectively manage and foster a positive school environment. Conflicts are inevitable in all types of schools. Managing conflicts and maintaining collaborations between partners are among the numerous responsibilities of school principals. This study may provide some practical evidence for school administrators and principals to manage and solve conflicts. **Research Methods:** Relational survey models were used in the study. "The Communication Competence Scale" and "the Organizational Conflict Scale" were applied to attain data on 245 teachers working in primary schools.

Findings: A meaningful relationship between communication competence of school principals and their conflict management styles was determined. It showed that the communication competence of school principals predicted their conflict management styles, according to teacher perceptions. **Implications for Research and Practice:** The findings reveal that teachers think that principals use avoiding and obliging styles at a medium level. When these styles are used to manage conflicts, the same problems may repeat in time. In this sense, school principals need to keep in mind that a current problem may be a source/potential of future problems. Therefore, it is suggested that school principals use avoiding and obliging styles less often.

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Introduction

In recent years, communication has been an important research subject in the administration field. Communication is a process of interaction in which individuals construct meanings and derivations via symbols (Wood, 2011, p. 3–4). According to Fielding (2006, p. 10), communication is an operation created with transactions of symbols by participants. Communication has personal, organisational, and social functions, such as informing, supervising, guiding, transmitting knowledge and skills, educating, integrating, expressing feelings, setting up social relationships, reducing anxiety and solving problems, giving performance feedback, entertaining, warning, assuming necessary roles, information sharing, persuading, and expressing emotions and innovations (Wood, 2012; Champoux, 2010; Tutar & Yilmaz, 2010). The communication process is one of the most significant processes concerning the success of administrators and the effectiveness of organisations, as it is a basic tool for an administrator to successfully accomplish tasks (Kocel, 2013, p. 403). The communication skills of administrators come into prominence when carrying out administrative activities. Studies have been implemented to determine the communication skills of school principals (Wee, 2011; Helmer, 2013; Uzun & Ayik, 2015). In the literature, conflict management has been discussed between teacher and student, principal and teacher, and among teachers (Cornille, Pestle & Vanwy, 1999; Laca, Alzate, Sanchez, Verdugo & Guzman, 2006; Morris-Rothschild & Brassard, 2006; Somech, 2008; Ikoya & Akinseindre, 2009; Ageng'a & Simatwa, 2011; Msila, 2012; Pinchevsky & Bogler, 2014).

Human beings are social creatures that communicate with numerous individuals throughout their lives. During this interaction, conflicts may occur among individuals due to countless reasons. Conflict may be defined as disagreements through which the parties involved perceive a threat to their needs, interests, or concerns (Polger, Poole and Stutman, 2013, p. 4; Tallo, 2008, p. 275). Putnam and Poole (1987, p. 552) defines conflict as “the interaction of interdependent people who perceive opposition of goals, aims, and values, and who see the other as potentially interfering with the realization of these goals”. Conflict is a process in which one party perceives that its interests are being opposed or negatively affected by another party (Wall and Callister, 1995). According to Thomas (1992), conflict is the process that begins when one party perceives that another has aggravated, or is about to aggravate, some concern of his. Upon analysing definitions about conflict, it is seen that the main factors of conflict are incompatibility, inscrutability, contradiction, being opposite to each other, prevention, and clash of ideas (Guney, 2011). The conflict process consists of five phases: potential contradiction or incompatibility, perception and personalisation, intentions, behaviours, and outputs (Robbins & Judge, 2012, p. 457). Conflict may have many several reasons to occur in any organisation. Upon analysing the literature, it is seen that the factors causing conflict are reasons related to communication, organisational structure, and personal behaviours (Wall and Callister, 1995; Tallo, 2008; Eunson, 2012; Griffin, 2013). “Conflict management at the organisational level is defined as finding a solution for the conflicts occurring in an organisation or within organisations, which will add

value to the aims and objectives of an organisation," (Guney, 2011, p. 307). "Preventing organisational conflicts is one of the major problems that administration encounters. However, conflicts are such to be managed" (Genc, 2007, p. 279).

There are different methods and styles used to manage conflicts in the literature. Five different methods by Blake and Mouton (1964) are described to be used to manage and solve conflicts: competing, accommodating, avoiding, compromising, and collaborating (cited by Sokmen & Yazicioglu, 2005, p. 7). Another conflict management approach, by Rahim and Bonoma (1979), is a two-dimensional approach that deals with interpersonal conflict management styles. The approach consists of two dimensions as an attempt to satisfy one's own concerns and attempt to satisfy the concerns of the other person." "The approach consists of five conflict management styles as integrating, obliging, avoiding, dominating, and compromise (Rahim & Magner, 1995; Rahim, 2002).

The integrating style consists of high interest from both an individual and the other person. This style is related to the collaboration of both sides in a conflict on subjects such as openness, information sharing, and analysing differences (Rahim & Magner, 1995). This style presumes coordination between managers and employees on an open, sharing ground. For example, a school principal meets the conflicting parties and negotiates probable solutions in an open, trusting way. The parties see the problem, reason with each other, and try to figure out various solutions regarding the problem.

The obliging style is about demonstrating a low concern for self and a high concern for others. This style is about the individual attempts to play down the differences and emphasise commonalities to satisfy the concern of others. A person who exercises the obliging style puts aside his own concerns to satisfy the concerns of the other party (Rahim, 2002). This style regards figuring out various solutions to be meaningless, which causes principals at schools to exercise caution towards conflictive solutions.

The dominating style is about demonstrating a high concern for self and a low concern for others. This style is identified with a win-lose orientation, and the expectations and needs of others are generally neglected in this style (Rahim, 2002). This style is about a school principal who aligns with one side and ignoring the needs and expectations of the other.

The avoiding style is related to a low concern for self and others. In this style, the individual tends to withdraw or sidestep. Individuals who have this style fail to satisfy his or her concerns and those of others. This style defines a school principal who refrains from solving the problem, and taking no responsibility for resolving the conflict.

The compromising style comprises intermediate concern for self and others. Both sides give up something to arrive at a mutually acceptable decision. This style can be useful if the both parties are equally powerful. This style may not be appropriate for a complex issue requiring a problem-solving approach (Rahim, 2002). This style

covers negotiation between the parties involved, as a school principal finds a moderate solution, which is to be accepted by the two conflicting parties. Thomas (1992) set his conflict management styles on two axes, labelled as "cooperativeness" and "assertiveness". This model involves five different styles of conflict: competing, avoiding, accommodating, collaborating, and compromising.

According to research, there is a relationship between the conflict management and problem-solving styles of school administrators and their leadership abilities (Dogan, 2012), instructional leadership (Arslantas & Ozkan, 2012), personality traits (Karakus & Cankaya 2009; Akinnubi, Oyeran, Fashuki & Durosaro, 2012), the environment of the organisation (Tanriverdi, 2008), stress and anger management (Gunduz, Tunc & Inandi, 2013), anger styles (Argon & Acikgoz, 2010), school climate (Boucher, 2013), and coercive and legitimate power (Riasi & Asadzadeh, 2016).

Upon analysing the literature, it can be seen that numerous studies have analysed the relationship between the communicational behaviours of the school administrators and their conflict management styles (Tabor, 2001; Sahin, 2007; Tekkanat, 2009; Firat, 2010; Demirkaya, 2012). A similar study has also analysed the relationship between the communication competence of school administrators and organisational conflict (Topluer, 2008).

Conflict management requires an interaction between a moderator and the third parties. Principals are a third party in solving a conflict among employees. When principals intervene, they start an interaction. Verbal and non-verbal communication from both principals and the conflicting parties affect this interaction. During the process, principals should listen to the parties carefully and try to show empathy. Principals should be able to give effective feedback and persuade the parties by affecting them. In order to achieve this, principals should demonstrate communication competences like effective listening and speaking, and showing empathy and understanding. Furthermore, employees think that conflict management is one the most important skills among the communication competences of a school principal. It is a fact that the relationship between communication competences and conflict management skills of principals is crucial for both effective management and a positive school environment.

Conflict in a school environment is inevitable. This study can provide applicable findings for school administrators and principals to manage and solve conflicts. In particular, considering the key role of the communication in interpersonal relations and the importance of conflict management styles in solving conflicts, it is expected that the findings of the study will provide a positive contribution to the literature. Within this framework, the following questions will be addressed:

1. At what level is the communication competence of the school principals, according to teacher perceptions?
2. What are the conflict management styles of the school principals, according to teacher perceptions?

3. Are there meaningful relationships between communication competence and conflict management styles of the school principals?
4. Does the communication competence of the school principals predict their conflict management styles at a meaningful level?

Method

Research Design

The present study is a correlational study that aims to determine the relationship between communication competency and conflict management styles of school principals. A correlational survey model was used as the main research approach.

Research Sample

The population of the study consisted of teachers working in 53 elementary schools in Palandoken County, Erzurum, in the 2012-2013 academic year. There are 950 teachers at these schools, and the study sample involved 245 teachers determined by the simple random sampling method from 15 elementary schools in Palandoken County. Random sampling means that everyone has the same chance to be included in the sampling. In order to implement simple random sampling, it is a must to know and list the population units. Then, these units are picked until the specified size has been reached (Buyukozturk, Cakmak, Akgun, Karadeniz and Demirel, 2014). In accordance with this method, 53 schools were listed and 15 of them were selected. As the next step, the number of teachers in these schools was listed, and the teachers were selected randomly. These teachers were given research forms and 245 forms were thought to be worthy of evaluation. Of the 245 teachers, 125 (51%) were females and 120 (49%) were males; 46 (18.8%) of these teachers had 1-5 years' experience, 52 (21.2%) had 6-10 years' experience, 62 (25.3%) had 11-15 years' experience, and 85 (34.7%) had 16 years and more of professional seniority.

Research Instruments and Procedures

"The Communication Competence Scale" developed by Wiemann (1977) and "The Rahim Organizational Conflict Inventory-II" developed by Rahim (1983) were used in the study.

Communication Competence Scale. The Communicative Competence Scale, developed by Wiemann (1977), involves 36 items and five sub-dimensions in its original form. The scale was adapted to Turkish by Topluer (2007). As a result of an exploratory factor analysis, Topluer (2008) stated that the 36 items have five dimensions. However, there is only one item under the fifth dimension, and only two under the fourth. In addition, as the factor load was calculated to be high under more than one dimension, five items were omitted. The remaining 31 items were subjected to varimax rotation, and the factor analysis was repeated. After the procedure, the scale was found to contain three sub-dimensions. These sub-dimensions are parallel to the original scale: empathy (17 items), social relaxation (7 items) and

affiliation/support (7 items). The scale was composed of a 5-point Likert Scale. The internal consistency coefficient (Cronbach's Alpha) of the scale and its sub-dimensions was found to be .95 in the "empathy" dimension, .76 in the "social relaxation" dimension, and .79 in the "affiliation/support" dimension.

The Rahim Organizational Conflict Inventory. The Rahim Organizational Conflict Inventory-II (ROCI-II), developed by Rahim (1983), was used to determine the conflict management styles of the school principals. The inventory has 28 items, composed of a 5-point Likert Scale. The five sub-dimensions of the inventory are as follows: integration (6 items), obliging (5 items), dominating (5 items), avoiding (6 items), and compromising (6 items). The inventory was adapted to Turkish by Gumuseli (1994). The inventory used in the study has been obtained from Tanriverdi (2008).

The reliability analysis of ROCI-II was redone for the study and the Cronbach's Alpha coefficient was found to .91. Cronbach's Alpha of the inventory that determines each conflict management style was .91 for the integrating dimension, .77 for the obliging dimension, .72 for the dominating dimension, .73 for the avoiding dimension, and .89 for the compromising dimension. These values show that the reliability of the inventory is high.

Data Analysis

To identify the communication competence and conflict management skills of the school principals, arithmetic means were calculated. In addition, to determine the relationship between communication competence and conflict management styles of the school principals, the Pearson Moment Correlation method was implemented. Furthermore, to determine whether the communication competence of the school principals predicts their conflict management styles, a multiple regression analysis was performed.

Results

The findings related to the communication competence and conflict management styles of the school principals, in accordance with the perceptions of the participants, are indicated in Table 1.

According to teacher perceptions in the working group, when analysing distributions related to communication competence and conflict management styles of the school principals, the highest value mean is observed to be (M: 3.88) in the affiliating/support dimension, while the lowest value mean is (M: 3.85) in the social relaxation dimension in terms of communication competence. Upon looking through the distributions related to conflict management styles, it is seen that the highest value mean is (M: 3.79) in the integrating dimension, while the lowest is (M: 2.75) in the dominating dimension.

Table 1

Arithmetic Mean and Standard Deviation Values Related to the Dimensions of Communication Competence and Conflict Management Styles

<i>Communication Competence</i>	<i>M</i>	<i>SD</i>
1. Empathy	3.86	.68
2. Social Relaxation	3.85	.58
3. Affiliation/Support	3.88	.65
<i>Conflict Management Styles</i>	<i>M</i>	<i>SD</i>
1. Integration	3.79	.83
2. Obliging	3.35	.77
3. Dominating	2.75	.82
4. Avoiding	3.32	.73
5. Compromising	3.58	.89

The Pearson product-moment correlation method was used to determine the relationship between the communication competence and conflict management styles of the school principals, and the results are indicated in Table 2.

Table 2.

Relationship between Communication Competence and Conflict Management Styles of School Principals

Variables	1	2	3	4	5	6	7	8
1. Empathy	-							
2. Soc. Relaxation	.87**	-						
3. Aff./Support	.64**	.45**	-					
4. Integration	.88**	.73**	.59**	-				
5. Obliging	.75**	.59**	.35**	.85**	-			
6. Dominating	-.24**	-.11	-.62**	-.28**	-.12**	-		
7. Avoiding	.52**	.40**	.23**	.59**	.63**	.07	-	
8. Compromising	.80**	.61	.53**	.93	.84**	-.22**	.67**	-

n=245, ***p*<.01, **p*<.05

Upon analysing Table 2, a meaningful relationship can be observed between communication competence and conflict management styles of the school principals

based on the perceptions of the teachers who participated in the study. There is a positive relationship between the understanding, empathy, social relaxation, and support dimensions of the communication competence scale, and the integrating, obliging, avoiding, and compromising dimensions of the conflict management scale. r values range between .23 and .81. The relationship between the understanding, empathy, and support dimensions of the communication competence scale and dominating dimension of the conflict management scale is found to be negative. r values range between -.24 and -.62.

Prediction of integrating dimension. The results of the multiple linear regression analysis related to the prediction of the integrating dimension are indicated in Table 3.

Table 3.

Regression Analysis Results related to Prediction of Integrating Dimension

Variable	B	Sh	β	t	p
Fixed	-.189	.200	-	-.943	.346
Empathy	1.212	.092	.994	13.135	.000*
Social Relaxation	-.207	.093	-.144	-2.232	.027*
Affiliation/Support	.025	.053	.019	.464	.643

F (3,245) = 287.667, $p < .05$, R = .884, $R^2 = .782$

As seen in Table 3, the empathy dimension ($\beta = .994$, $p < .01$) of the communication competence scale predicts the perceptions of the participants related to the integrating dimension of the conflict management style inventory in a positive way and at a meaningful level. Furthermore, it is seen that the social relaxation dimension ($\beta = -.144$, $p < .05$) predicts the perceptions of the participants related to the integrating dimension of the conflict management style inventory in a negative way and at a meaningful level. However, the affiliation/support dimension ($\beta = .019$, $p > .05$) of the communication competence scale is not a meaningful predictor of the integrating dimension of the conflict management style inventory. All the dimensions of the communication competence scale together explain 78% of the total variance of the perception of the participants about the integration dimension of the conflict management style inventory.

Prediction of obliging dimension. The results of the multiple linear regression analysis related to the prediction of the obliging dimension are indicated in Table 4.

Table 4*Regression Analysis Results related to Prediction of Obliging Dimension*

Variable	B	Sh	β	t	p
Fixed	1.259	.232	-	5.431	.000
Empathy	1.537	.107	1.372	14.392	.000*
Social Relaxation	-.601	.107	-.455	-5.591	.000*
Affiliation/Support	-.395	.062	-.334	-6.395	.000*

F (3.245) = 151.774, p<.05, R= .809, R²=.654

As seen in Table 4, the empathy dimension ($\beta=1.372$, $p<.01$) of the communication competence scale predicts the perceptions of the participants related to the obliging dimension of the conflict management style inventory in a positive way and at a meaningful level. Furthermore, the social relaxation ($\beta=-.455$, $p<.01$) and affiliation/support ($\beta=-.334$, $p<.01$) dimensions predict the perceptions of the participants related to the obliging dimension of the conflict management style inventory in a negative way and at a meaningful level. All the dimensions of the communication competence scale together explain 65% of the total variance of the perception of the participants about the obliging dimension of the conflict management style inventory.

Prediction of dominating dimension. The results of the multiple linear regression analysis related to the prediction of the dominating dimension are indicated in Table 5.

Table 5*Regression Analysis Results related to Prediction of Dominating Dimension*

Variable	B	Sh	β	t	p
Fixed	5.300	.319	-	16.613	.000
Empathy	.236	.147	.197	1.609	.109
Social Relaxation	.105	.148	.074	.714	.476
Affiliation/Support	-.994	.085	-.784	-11.704	.000*

F (3.245) = 60.969, p<.05, R= .657, R²=.431

As seen in Table 5, the affiliation/support dimension ($\beta=-.784$, $p<.01$) of the communication competence scale predicts the perceptions of the participants related to the dominating dimension of the conflict management style inventory in a negative way and at a meaningful level. However, the empathy ($\beta=.197$, $p>.05$) and social relaxation ($\beta=.197$, $p>.05$) dimensions are not predictors of the dominating dimension of the conflict management style inventory. All the dimensions of the communication competence scale together explain 43% of the total variance of the

perception of the participants about the dominating dimension of the conflict management style inventory.

Prediction of avoiding dimension. The results of the multiple linear regression analysis related to the prediction of the avoiding dimension are indicated in Table 6.

Table 6.

Regression Analysis Results related to Prediction of Avoiding Dimension

Variable	B	Sh	β	t	p
Fixed	2.067	.309	-	6.695	.000
Empathy	1.104	.142	1.029	7.763	.000*
Social Relaxation	-.478	.143	-.378	-3.339	.001*
Affiliation/Support	-.300	.082	-.265	-3.643	.000*

F (3,245) = 39.636, p<.05, R=.575, R²=.330

As seen in Table 6, while the empathy dimension ($\beta=1.029$, p<.01) of the communication competence scale predicts the perceptions of the participants related to the avoiding dimension of the conflict management style inventory in a positive way and at a meaningful level, the social relaxation ($\beta=-.378$, p<.01) and affiliation/support ($\beta=-.265$, p<.01) dimensions predict it in a negative way and at a meaningful level. All the dimensions of the communication competence scale together explain 33% of the total variance of the perception of the participants about the avoiding dimension of the conflict management style inventory.

Prediction of compromising dimension. The results of the multiple linear regression analysis related to the prediction of the compromising dimension are indicated in Table 7.

Table 7

Regression Analysis Results related to Prediction of Compromising Dimension

Variable	B	Sh	β	t	p
Fixed	.297	.258	-	1.150	.251
Empathy	1.553	.119	1.196	13.071	.000*
Social Relaxation	-.616	.120	-.403	-5.154	.000*
Affiliation/Support	-.088	.069	-.064	-1.278	.203

F (3,245) = 171.295, p<.05, R= .825, R²= .681

As seen in Table 7, the affiliation/support ($\beta=.64$, p>.05) dimension of the communication competence scale is not a predictor of the compromising dimension of conflict management styles. The empathy ($\beta=1.196$, p<.01) dimension of the communication competence scale predicts teacher perceptions related to the

compromising dimension of the conflict management style inventory in a positive way and at a meaningful level. Furthermore, it is seen that the social relaxation ($\beta=-.403$, $p<.01$) dimension predicts the teacher perceptions related to the compromising dimension of the conflict management styles inventory in a negative way and at a meaningful level. All the dimensions of the communication competence scale together explain 68% of the total variance of the perception of the participants about the compromising dimension of the conflict management style inventory.

Discussion and Conclusion

In this study, the relationship between the communication competence and conflict management styles of the school principals has been analysed in accordance with teacher perceptions. According to the results of the study, there is a relationship between the communication competence and conflict management styles of the school managers, according to teacher perceptions, and the communication competence of the school principals predicts their conflict management styles.

Based on the perceptions of the teachers in the working group, upon analysing the distributions related to the communication competence level of the school principals, it is seen that the highest average is in the affiliation/support dimension in terms of the communication competence scale dimensions, while the lowest is in the social relaxation dimension. The findings related to communication competence show that the communication competence levels of the school managers are adequately and highly perceived, according to teacher perceptions. The findings of the study related to communication competence are parallel to the studies of Tabor (2001), Jones (2006), Topluer (2008), Sahin (2007), Demirkaya (2012), and Uzun & Ayik (2015). These studies were conducted to observe the communication competence of school principals based on the perceptions of elementary and secondary school teachers, and they stated that the communication competence of the school principals was high.

The findings revealed that school principals use integrating skills "highly" in managing conflicts. This result is also confirmed by the findings of Sahin (2007); Tanriverdi (2008), Acikgoz (2009), and Kocak and Atanur-Baskan (2013). Principals use the avoiding and obliging styles at a "medium" level when managing conflict. These findings have previously been verified by the works of Tanriverdi (2008), Acikgoz (2009), and Kocak and Atanur-Baskan (2013). Principals using compromising and dominating styles at a "medium" level in conflict management has also been examined by Sahin (2007). According to the perceptions of the teachers in the working group, upon analysing the results related to the conflict management styles of the school principals, the highest average can be seen is in the integrating dimension, while the lowest is in the dominating dimension. These findings are completely parallel to the findings of Topluer (2008), Acikgoz (2009), and Arslantas and Ozkan (2012), determining that school principals use integrating the most and dominating the least in conflict management; these findings are partially parallel to those of Tanriverdi (2008), stating that school principals use integrating styles the

most in the conflicts with teachers, according to teacher perceptions. Karakus and Cankaya (2009), Firat (2010), and Kocak and Atanur-Baskan (2013) stated that school administrators use integrating styles the most. These findings are parallel to the results of this study.

According to the findings of the study, there is a meaningful relationship between the teacher perceptions and the communication competence and conflict management styles of the school principals. A meaningful, positive relationship has been found between the empathy, social relaxation, and affiliation/support dimensions of the communication competence scale, and the integrating, obliging, avoiding, and compromising dimensions of the conflict management style inventory. However, a meaningful, negative relationship was found between the empathy dimension of the communication competence scale and the dominating dimension of the conflict management style inventory, and between the affiliation/support dimension and the dominating dimension. After evaluating the findings, the degree of communication competence shows that the concern for both parties is high, and it increases the use of the styles in which collaboration is dominant. The highest positive relationship with communication competence was observed is in the integrating style, followed by the compromising style. The results prove that the hypothetical information and the data obtained through conducting the questionnaires are consistent with each other. Analysing the literature, the findings of the studies conducted by Tabor (2001), Tekkanat (2009), Sahin (2007), Firat (2010), and Demirkaya (2012) correspond to the findings of this study. In addition, these findings are parallel to the findings of Corn (2013), Ustuner and Kis (2014), and Okcu, Dogan, and Dayanan, (2016).

According to the findings of the study, the empathy dimension of the communication competence scale predicts the perceptions of the participants towards the integrating, avoiding, obliging, and compromising dimensions of the conflict management style inventory in a positive way and at a meaningful level. Yet, the empathy dimension is not a meaningful predictor of the dominating dimension. Furthermore, the social relaxation dimension of the communication competence scale predicts the perceptions of the participants towards the integrating, obliging, avoiding, and compromising dimensions of the conflict management style inventory in a negative way and at a meaningful level. However, the social relaxation dimension is not a meaningful predictor of the dominating dimension. The findings of the study show that the affiliation/support dimension of the communicative competence scale predicts the perceptions of the participants towards the obliging, avoiding, and dominating dimensions of the conflict management inventory in a negative way and at a meaningful level. The affiliation/support dimension is not a meaningful predictor of the integrating and compromising dimensions. The findings show that the communication competence of the school principals is a significant predictor in conflict management. Therefore, it can be said that effective communication is a key factor in managing and solving conflicts. It can also be understood from the obtained data that school administrators who have an elevated level of communication competence can manage conflicts more effectively. Upon

analysing the literature, it can be seen that the findings of the studies executed by Sahin (2007), Firat (2010), Okcu, Dogan and Dayanan, (2016), and Ustuner and Kis (2014) are parallel to the findings of this study. After making a general evaluation based on the findings of this study, it can be said that there is a relationship between modes of communication and conflict management styles in terms of teacher perceptions, and the mode of communication that school administrators use predicts their conflict management styles.

In accordance with the findings, the following suggestions are recommended:

The findings reveal that the teachers think that the principals exercise avoiding and obliging styles at a medium level. When these styles are used in managing conflicts, the same problems may repeat in time. In this sense, school principals need to keep in mind that the current problem may be a source/potential of future problems. Therefore, it is suggested that school principals use avoiding and obliging styles less often.

It is found that teachers think that principals exercise dominating styles at a medium level. Principals tend to find temporary solutions to the problems via legal power that they possess, when principals need to keep in mind that teachers may be forced to work, which may foster a negative perception. This means that principals need to use dominating styles less often in managing conflicts.

The results show that principals use compromising styles at a medium level. This style regards a common way for all the conflicting parties negotiate with each other. Hence, this style needs to be used more often. For future research, it is recommended that the relationship between the school principals' conflict management styles and the teachers' job satisfaction, performance, motivation, and school culture and climate may be studied.

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Okul Müdürlerinin İletişim Yeterlikleri İle Çatışma Yönetim Stilleri Arasındaki İlişki

Atıf:

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Özet

Problem Durumu: Öğretmen algılarına göre, okul müdürlerinin iletişim yeterlikleri ile çatışma yönetim stilleri arasındaki ilişkinin belirlenmesi hem okul müdürlerinin etkin yönetim sergilemesi, hem de olumlu bir okul iklimi açısından önemlidir. Okul ortamında çatışmaların olması kaçınılmaz görülmektedir. Okul ortamında çatışmaların yönetilmesi ve tüm paydaşlar arasında işbirliğinin sağlanması okul müdürlerinin görevleri arasında bulunmaktadır. Bu çalışma tüm okul yöneticileri ve müdürlerine, çatışmaları yönetme ve çözme konusunda uygulamaya yönelik bazı bulgular sağlayabilir. Özellikle kişilerarası ilişkilerde iletişimin anahtar rolü ve anlaşmazlıkların çözümünde de çatışma yönetim stillerinin önemi düşünüldüğünde, araştırma sonuçlarının literatüre olumlu katkılar sunması beklenmektedir.

Araştırmanın Amacı: Bu çalışmada ilköğretim okullarında görev yapan öğretmenlerin algılarına göre, okul müdürlerinin iletişim yeterlikleri ve çatışma yönetme biçimleri arasındaki ilişkinin incelenmesi amaçlanmıştır. Bu bağlamda çalışmada şu sorulara cevap aranmıştır:

1. Öğretmen algılarına göre okul müdürlerinin iletişim yeterlikleri ne düzeydedir?
2. Öğretmen algılarına göre okul müdürlerinin çatışma yönetme stilleri nasıldır?
3. Okul müdürlerinin iletişim becerileri ile çatışma yönetme stilleri arasında anlamlı ilişkiler var mıdır?
4. Okul müdürlerinin iletişim becerileri çatışma yönetme stillerini anlamlı düzeyde yordamakta mıdır?

Araştırmanın Yöntemi: Araştırmanın modelini tarama modellerinden ilişkisel tarama modeli oluşturmaktadır. İlköğretim okulunda görev yapan 245 öğretmene verilerin toplanması için Wiemann (1977) tarafından geliştirilen "İletişim Yeterlikleri Ölçeği" ve Rahim (1973) tarafından geliştirilen "Örgütsel Çatışma Ölçeği" uygulanmıştır. İletişim yeterlikleri ölçeği, empati, sosyal rahatlık ve destekleme olmak üzere üç boyuttan oluşmaktadır. Ölçeğin güvenilirliği empati boyutu için .95, sosyal rahatlık boyutu için .76, destekleme boyutu için .79 olarak hesaplanmıştır. Örgütsel Çatışma Ölçeği; tümleştirme, ödün verme, hükmetme, kaçınma ve uzlaşma olmak üzere 5 alt boyuttan oluşmaktadır. Ölçeğin güvenilirliği .91 olarak hesaplanmıştır.

Araştırmanın Bulguları: Okul müdürlerinin iletişim yeterlikleri, en yüksek destekleme boyutunda (M: 3.88), en düşük sosyal rahatlık boyutunda (M: 3.85)'dir. Okul müdürleri çatışma yönetim stillerinden, en yüksek tümleştirme (M: 3.79), en düşük hükmetme (M: 2.75) stilini kullanmaktadır. Araştırmaya göre; okul müdürlerinin iletişim yeterlikleri ve çatışma yönetim stilleri arasında anlamlı ilişkilerin olduğu görülmektedir. İletişim yeterlikleri ölçeğinin, anlama empati kurabilme, sosyal rahatlık ve destekleme boyutları ile çatışma yönetim stilleri ölçeğinin tümleştirme, ödün verme, kaçınma ve uzlaşma boyutları arasında pozitif yönde anlamlı bir ilişki bulunmuştur. r değerleri, .23 ile .81 arasında değişmektedir. İletişim yeterlikleri ölçeğinin anlama empati kurabilme ve destekleme boyutu ile çatışma yönetim stilleri ölçeğinin hükmetme boyutu arasında negatif yönde anlamlı bir ilişki bulunmuştur. r değerleri, -.24 ile -.62 arasında değişmektedir. Araştırma bulguları, öğretmen algılarına göre, okul müdürlerinin iletişim yeterliklerinin çatışma yönetim stillerini yordadığını göstermektedir. İletişim yeterlikleri ölçeğinin anlama empati kurabilme ($\beta=.994$, $p<.01$) boyutu araştırmaya katılanların çatışma yönetim stilleri ölçeğinin tümleştirme boyutuna yönelik algılarını pozitif yönde ve anlamlı düzeyde yordamaktadır. Bunun yanında, sosyal rahatlık ($\beta= -.144$, $p<.05$) boyutu ise çatışma yönetim stilleri ölçeğinin tümleştirme boyutuna yönelik algıları negatif yönde ve anlamlı düzeyde yordadığı görülmektedir. İletişim yeterlikleri ölçeğinin destekleme ($\beta=.019$, $p>.05$) boyutu çatışma yönetim stilleri ölçeğinin tümleştirme boyutunun anlamlı yordayıcısı değildir. İletişim yeterlikleri ölçeğinin anlama empati kurabilme ($\beta=1.372$, $p<.01$) boyutu, araştırmaya katılanların çatışma yönetim stilleri ölçeğinin ödün verme boyutuna yönelik algılarını pozitif yönde ve anlamlı düzeyde yordamaktadır. Bunun yanında, sosyal rahatlık ($\beta=-.455$, $p<.01$) ve destekleme ($\beta=-.334$, $p<.01$) boyutları ise çatışma yönetim stilleri ölçeğinin ödün verme boyutuna yönelik algıları negatif yönde ve anlamlı düzeyde yordamaktadır. İletişim yeterlikleri ölçeğinin destekleme ($\beta=-.784$, $p<.01$) boyutu, araştırmaya katılanların çatışma yönetim stilleri ölçeğinin hükmetme boyutuna yönelik algılarını negatif yönde ve anlamlı düzeyde yordamaktadır. Anlama empati kurabilme ($\beta=.197$, $p>.05$) ve sosyal rahatlık ($\beta=.197$, $p>.05$) boyutları çatışma yönetim stilleri ölçeğinin hükmetme boyutunun anlamlı yordayıcısı değildir. İletişim yeterlikleri ölçeğinin anlama empati kurabilme ($\beta=1.029$, $p<.01$) boyutu, çatışma yönetim stilleri ölçeğinin kaçınma boyutunu pozitif yönde ve anlamlı düzeyde yordarken, sosyal rahatlık ($\beta=-.378$, $p<.01$) ve destekleme ($\beta= -.265$, $p<.01$) boyutları çatışma yönetim stilleri ölçeğinin kaçınma boyutunu negatif yönde ve anlamlı düzeyde yordamaktadır. İletişim yeterlikleri ölçeğinin anlama empati kurabilme ($\beta=1.196$, $p<.01$) boyutu, çatışma yönetim stilleri ölçeğinin uzlaşma boyutunu pozitif yönde ve anlamlı düzeyde yordamaktadır. Bunun yanında, sosyal rahatlık ($\beta=-.403$, $p<.01$) boyutu ise çatışma yönetim stilleri ölçeğinin uzlaşma boyutunu negatif yönde ve anlamlı düzeyde yordamaktadır.

Araştırmanın Sonuçları ve Önerileri: Araştırmanın önemli sonuçları şöyle özetlenebilir: 1) Öğretmenlerin algılarına göre, okul müdürlerinin iletişim yeterliklerini en yüksek destekleme boyutunda en düşük sosyal rahatlık boyutunda kullandığı ortaya çıkmıştır. 2) Okul müdürlerinin çatışma yönetim stillerinden en çok bütünleştirme en az hükmetme stilini kullandıkları ortaya çıkmıştır. 3) Okul müdürlerinin iletişim

yeterlikleri ölçeğinin anlama empati boyutuyla; çatışma yönetim stillerinden tümleştirme, uzlaşma ve ödün verme stilleriyle pozitif yönde yüksek, kaçınma stiliyle pozitif yönde orta, hükmetme stiliyle negatif yönde düşük bir ilişki bulunmaktadır. 4) Okul müdürlerinin iletişim yeterlikleri ölçeğinin sosyal rahatlık boyutuyla; çatışma yönetim stillerinden tümleştirme stiliyle pozitif yönde yüksek, kaçınma uzlaşma ve ödün verme stilleriyle pozitif yönde orta, hükmetme stiliyle negatif yönde düşük bir ilişki bulunmaktadır. 5) Okul müdürlerinin iletişim yeterlikleri ölçeğinin destekleme boyutuyla; çatışma yönetim stillerinden tümleştirme, uzlaşma ve ödün verme stilleriyle pozitif yönde orta, kaçınma stiliyle pozitif yönde düşük, hükmetme stiliyle negatif yönde orta bir ilişki bulunmaktadır. 6) Okul müdürlerinin iletişim yeterlikleri ölçeğinin anlama empati boyutu; çatışma yönetim stillerinden tümleştirme, ödün verme, kaçınma, uzlaşma boyutlarını pozitif yönde anlamlı düzeyde yordamaktadır. 7) Okul müdürlerinin iletişim yeterlikleri ölçeğinin sosyal rahatlık boyutu; çatışma yönetim stillerinden tümleştirme, ödün verme, kaçınma, uzlaşma boyutlarına yönelik algılarını negatif yönde ve anlamlı düzeyde yordamaktadır. 8) Okul müdürlerinin iletişim yeterlikleri ölçeğinin destekleme boyutu; çatışma yönetim stillerinden ödün verme, kaçınma, hükmetme boyutlarına yönelik algılarını negatif yönde ve anlamlı düzeyde yordamaktadır.

Araştırma bulguları, öğretmen algılarına göre okul müdürlerinin kaçınma ve ödün verme stillerini orta düzeyde kullandıkları yönündedir. Çatışmaların çözümünde kaçınma ve ödün verme stili kullanıldığında, zaman içerisinde aynı problemler yeniden ortaya çıkabilmektedir. Bu anlamda okul müdürleri, kaçınma ve ödün verme stilini kullanırken mevcut sorunun ileriki dönemlerde potansiyel çatışmalara kaynaklık edebileceğini dikkate almalıdırlar. Bu açıdan okul müdürleri kaçınma ve ödün verme stillerini daha az kullanmalıdırlar.

Bulgular, okul müdürlerinin hükmetme stilini orta düzeyde kullandıklarını göstermektedir. Okul müdürü, hükmetme stilinde yasal gücünü kullanarak çatışmaya geçici çözümler getirmektedir. Bu durumda okul müdürleri öğretmenlerin bir dizi olumsuz tutum içinde çalışmak zorunda kalabileceklerini de dikkate almalıdırlar. Bu bağlamda okul müdürleri hükmetme stilini daha az kullanmalıdırlar.

Bulgular, uzlaşma stilini orta düzeyde kullandıklarını göstermektedir. Bu stil, okulda çatışma yaşayan tarafların kabul edebileceği ortak bir çözüm yolu ile ilgilidir. Bu bağlamda okul müdürleri bu stili daha fazla kullanmalıdır.

Anahtar Sözcükler: Öğretmen algıları, empati, destek, bütünleştirme, kaçınma, hükmetme.



Coping Strategies of Pre-Service Teachers of Turkish with Tensions in Achieving Agency

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ABSTRACT

Purpose: Pre-service and in-service teachers experience conflicts between the requirements of teaching and their own personal desires, which might lead to serious tensions with negative consequences. Teachers, especially pre-service teachers, try to cope with tensions by developing strategies accompanied by actions teachers take to modify the teaching context and achieve teacher agency. The purpose of this study was to identify how pre-service teachers in Turkey cope with different types of tensions during their

practicum in schools. This study also investigated how their coping strategies motivate actions to develop teacher agency. **Research Methods:** This was a qualitative study guided by symbolic interactionism focusing on how shared meanings are constructed and mediated. Data were collected through reflective journals, semi-structured interviews, and a focus group interview to obtain the meanings made by pre-service teachers. Eight pre-service teachers of Turkish language at a public university participated in the study. Data were analyzed through content analysis. **Findings:** Findings reveal that pre-service teachers experience all types of tensions described in the literature and cope with them using four of the strategies mentioned in the literature. They do not receive help without asking for it. Many teachers turn to people around them to find a solution, but not many of them take initiatives to achieve agency. **Implications for Research and Practice:** Findings from the study display that pre-service teachers suffer from tensions in their teaching experiences in schools. They do not receive help without asking. For a qualified teacher identity process, continuous mediation should be at pre-service teachers' disposal and teachers should not be left alone. Supervisors at the faculties of education should raise pre-service teachers who are aware of tensions, coping strategies, and teacher agency issues.

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Introduction

“I sometimes feel like I am on the brink of being a good teacher; however, this feeling does not last long. Soon I start to feel that I would like to live as a university student forever. However, what I do is learn to stay in school, the place I will always belong to” (Zehra).

This striking and thought-provoking remark is a piece of reality sometimes exempted from and sometimes relying on what is taught in pre-service teacher education programs and what is experienced in different institutions (Allen & Wright, 2014; Cochran-Smith, 2005; Korthagen, 2010; Yayli, 2008). The feeling expressed here could be categorized as a combination of a tension and an action taken to solve the tension. In other words, this excerpt provides a context in which tensions are experienced and teacher identity is constructed. The way the pre-service teacher negotiates the tension displays an action of teacher agency in the communities of prescribed structures (Biesta, Priestley & Robinson, 2015).

Professional Teacher Identity Formation and Teacher Tensions

According to Wenger (1998), interest in identity issues in a specific context both narrows the focus on the person with a point of view of social realities and broadens it “beyond communities of practice”, and “the concept of identity serves as a pivot between the social and the individual” (p. 145). What Wenger notes here is not a dichotomy between the self and the society; on the contrary, “it is the social, the cultural, the historical with a human face” (p. 145). Focusing on the identity formation processes that teachers experience could be a feasible starting point for teacher development (Beauchamp & Thomas, 2009), as identity formation includes both the individual and professional facets of becoming a teacher (Olsen, 2010). The individual and professional processes may accommodate some conflicts between the requirements of the profession and personal desires (Beijaard, Meijerd, & Verloop, 2004), which might “result in serious tensions for teachers that could have severe consequences” (Pillen, Beijaard, & den Brok, 2013a, p. 661) for teachers.

The issue of tension has been investigated in a considerable amount of research (Pillen et al., 2013a). According to Beauchamp and Thomas (2009), tensions have a big influence on the theoretical and practical development of all teachers. Tensions provide beginning teachers with opportunities to question their identity formation processes (Smagorinsky, Cook, Moore, Jackson & Fry, 2004) or end in serious consequences (Pillen et al., 2013a). Developing strategies and overcoming such suffering is crucial for teachers to adapt to the teaching profession and its setting.

Research has recently concentrated on how tensions occur and how teachers cope with them in teacher education. Pillen et al. (2013a) perused the teacher education literature and proposed a list of tensions for beginning teachers with which they conducted a study with 24 beginning teachers. Their findings revealed three main categories:

- (1) The change in role from student to teacher;
- (2) Conflicts between desired and actual support given to students; and
- (3) Conflicting conceptions of learning to teach.

Coping with Tensions and Achieving Teacher Agency

Pillen, Beijard and den Brok (2013b) focused on coping strategies with tensions of beginning teachers to state that both emotion-focused and problem-focused coping behaviors are used by novice teachers. After a tension questionnaire, an instrument including five different strategies of coping with tensions was applied and participants were asked to choose among the following strategies for their own cases:

- (1) Searching for a solution yourself;
- (2) Asking for help by speaking about the tension with a significant other;
- (3) Receiving help without taking an initiative;
- (4) Putting up with the situation; and
- (5) Receiving help without asking for it.

Teacher identity formation has processes regarding tension formation, the ways of negotiating them, and opportunities for teachers and teacher educators “to help their student teachers to turn tensions into learning moments” (Pillen et al., 2013a, p. 675). Sachs (2005) noted that identity is not a stable entity; it is not given to teachers by others. On the contrary, it is negotiated through experience and through the sense produced by that experience. Finally, it becomes a mediator between the teacher agency and the given structure (Flores & Day, 2006). Teachers negotiating their tentative identities also negotiate the tensions in the setting of teaching. According to Smagorinsky et al. (2004), tensions could be productive and this productivity is fortified with the help of efforts of teachers in solving the challenging problems. Thus, coping with tensions is a crucial component of teacher identity construction, as tensions could be very serious. Therefore, novice teachers need to learn how to cope with tensions (Pillen et al., 2013b) that are a natural pathway to identity formation.

Pillen et al. (2013a) argued that beginning teachers should not be left alone as they need support from teacher educators and mentors. They underscore the idea that novice teachers who share their tensions will receive help from others. Consequently, sharing these tensions seems to be a critical strategy to overcome potential problems.

According to Wenger (1998), identity formation needs to negotiate new situations and the associated tensions in those situations. In those cases, teachers take actions that help them resolve the tensions they experience. Recent research on teacher education has focused on teacher agency, which can be defined as a teacher’s manipulation to shape their teaching tasks and conditions (Biesta et al., 2015). Developing agency in teachers has a lot to do with identity formation (Zembylas, 2005), as teachers might be able to eliminate the efforts to replace the teacher agency with prescriptive practices thanks to their professionally developed identities. A person equipped with power, thus with a well-developed “self”, could resist any pressure as “[p]ower is what says no” (Foucault, 1980, p. 139). The process of professional identity development of teachers is expected to promote teacher agency so that teachers could consciously regulate their own work and anything related to their work. According to Biesta et al. (2015), agency is apparent in the activities of teachers and in their reactions to given situations and contexts, but agency is “not a quality of the actors themselves” (p. 626). To them, the achievement of agency should be understood through its iterational (past), practical-evaluative (present), and projective (future) dimensions. That is, traces from all these dimensions are inherent in the actions of teachers.

Coping with and negotiating the tensions could inherently bear an action towards a problem (Pillen et al., 2013b). When teachers decide to modify the context to make conditions better for teaching, they act in a way they choose or are advised by senior teachers, mentors, supervisors, or principals. If they keep silent and do nothing, this means they are emotionally influenced and they believe that they can change nothing (Admiraal, Korthagen, & Wubbels, 2000). Any attempt to change the circumstances in the teaching setting, however, could be taken as an endeavor to manipulate the context, which develops teacher agency. Few studies have looked into the issue of teacher tensions (Yayli, 2008) in a Turkish setting. Also, no research has been conducted with the aim of investigating the coping strategies of teachers with tensions and the relationship between those strategies and agency building. Thus, this study aimed to report on how pre-service teachers in Turkey cope with various tensions during their practicum period in schools. It also investigated how their strategies motivate actions to develop teacher agency. With these purposes in mind, this study aimed to answer the following research questions:

- (1) How do Turkish pre-service teachers cope with different types of tensions in their processes of identity formation?
- (2) How do their coping experiences motivate actions in their work?

Method

Research Design

This study was guided by symbolic interactionism (Blumer, 1969), which “focuses on the construction and mediation of shared meanings. Teaching is unique in that prospective teachers have extensive opportunities to observe the profession from their time as a student” (Sexton, 2008, p. 74). Symbolic interactionism sees human beings, therefore teachers, as active agents in shaping their worlds depending on the socially constructed meanings (Allen & Wright, 2014) they ascribe to the things end events. Those meanings are not stable, but modified through social interaction. Pre-service teachers construct meanings as they encounter people, things, and events, and these meanings convey epistemological clues of their identity construction. Thus, research on meanings based on symbolic interactionism could provide everyone in the field of teacher education with valuable findings and implications.

Context and Research Sample

Teachers in Turkey do not have the desired flexibility to shape their working settings and conditions. The rigid centralized structure of the public schools imposes prescriptive programs, syllabi, testing, and other practical issues on teachers no matter whether the practitioners are novice or experienced teachers (Uygun, 2008). For this study, pre-service teachers were chosen purposely bearing in mind that any dichotomy in the early years of teaching could end in tensions of various kinds (Pillen et al., 2013a). Being able to cope with the tensions in their early experiences, pre-service teachers might expand their agency for actions in different contexts. As shown in Table 1, the participants of the study include eight pre-service teachers (six females and two males) of Turkish language studying at a public university in Turkey. After the fall term during which they observed classes, they stated that they had some frustrations about teaching among other pre-service teachers. Therefore, the sampling of the participants was purposive. They all volunteered for the study

and willingly participated in each data collection procedure during their internships at a public school. They stated that they benefited from this piece of research experience, answered every question, and reflected on their teaching sessions sincerely.

Table 1

Study participants

<i>Name (Pseudonym)</i>	<i>Gender</i>	<i>Age</i>
Zehra	Female	21
Canan	Female	22
Sema	Female	22
Serap	Female	21
Belma	Female	22
Emel	Female	22
Zafer	Male	23
Selim	Male	22

Research Instruments and Procedure

The qualitative data for this study were collected through reflective journals, face-to-face semi-structured interviews, and one focus group interview. Each of the pre-service teachers volunteered to keep a journal in which they reflected on their observations and teaching sessions throughout the spring term of an academic year. They made daily entries and knew that they could be critical for the reflection as proposed in the literature (Hatton & Smith, 1995; Zeichner & Liston, 2010). The meanings the participants made throughout the study were analyzed to trace probable signs of tensions (Lauriala & Kukkonen, 2005) and understand how they took actions to evade those tensions.

The entries were made and the interviews were held in Turkish. For the validity of interview questions, a colleague in the field of educational sciences was consulted. The interview took about 25 minutes for each participant. It was conducted in the office of the researcher. One focus group interview was held in a classroom setting at the end of the term.

Validity and Reliability

For the internal validity of the study, opinions were collected from the experts on the design, instruments, and data analysis. The sources of information in data collection were also triangulated (journal keeping, interview, and focus group interview) to justify the themes. The purposive sampling in the study was another factor that supported the internal and external validity. In addition, through cross-checking, an intercoder reliability of .94 was achieved for the codes and the themes with the help of another expert in the field of educational sciences (Creswell, 2014).

The remaining issues were negotiated for full agreement. The meanings made by the participants were supported by intact excerpts quoted from the data.

Data Analysis

Collected data were analyzed within the framework of tension types proposed by Pillen et al. (2013a). To reach the meanings of the participants, a qualitative content analysis was conducted to derive codes and themes from the transcripts of journals, interviews (Bogdan & Biklen, 1998; Creswell, 2004), and a focus group interview. The verbatim excerpts to be included in the findings section were translated into English by the researcher. The codes and themes were agreed on and negotiated with another researcher to reach a more reliable analysis. The findings were discussed according to the aforementioned framework of tension types.

Results

Findings from the qualitative data analysis are presented within the boundaries of predetermined framework adopted from Pillen et al. (2013a) study. Under each subheading, depending on the presented excerpts, obtained tensions from pre-service teachers of Turkish language are deeply discussed in terms of coping with the tension and teacher agency. These subheadings are 'the role change', 'support to students', and 'conceptions of learning to teach'.

The Role Change

The double role of pre-service teachers in schools can give rise to tensions during the faculty-school partnership period. Pre-service teachers are both students and novice teachers while they perform an internship at their future institutions. They seem to shuttle between the faculty and the school. The opening words of this paper uttered by Zehra show that she prefers being a student to being a teacher as the new role creates a burden on her. In the interview, she also said:

I think being a teacher is very prestigious and I like this job. However, a university student is much freer than a teacher since they (students) have fewer responsibilities. [R: What kind of responsibilities?] Your dressing, seriousness, punctuality, for instance. You feel you have suddenly grown up.

Zehra noted her complaints about the formal role accompanying the job of teaching. She found her new role a bit scary and resisted it by saying she would like to live as a university student forever. Experiencing a similar cross-institutional tension, Belma added:

The atmosphere at university was more relaxed in terms of bureaucracy. However, you do not feel so free in schools. I think being a university student is much better than being a teacher. You have a lot of responsibilities as a teacher.

Neither Zehra nor Belma wanted to take on the responsibility of being a teacher. They felt the tension of role change from the point of view of disciplining themselves

as teachers. This is a case of 'feeling like a student' rather than 'acting like an adult teacher' as proposed by Pillen et al. (2013a,b).

When asked how they cope with their tensions, Zehra said:

I frequently ask myself about who I am in this school. I repeat the answer "You are a teacher" until I feel I am a teacher. I know I am a teacher and I belong to the community of teachers.

Zehra engaged in a sort of self-therapy. She tried to find the solution by herself without asking for help. She stated that she did not ask anyone for help because she believed the problem was something individual. On the other hand, Belma said she did nothing to get rid of the tension she experienced:

Actually, I did not do anything about it. I thought everything would be better in time and get accustomed to my new position in life. I decided to wait until things got better. [R: Why?] I know that people experience similar things and that they can do much to handle them. [R: Do you think it worked?] Yes, a little.

Belma also took the role change as an individual issue, but, unlike Zehra, she just waited. Her way of acting (or not acting) did not successfully cope with the tension and she did not do anything to change the context for herself. She adopted a strategy of putting up with the situation. In other words, she did not achieve agency at all because she thought the tension was something personal. Zehra, on the other hand, took an individual action and stood against the role change tension.

Tensions about role change are considered personal processes of teacher identity formation by other participants as well. They mostly stated that they tried to cope with the problem by themselves without taking definitive action. None of the participants asked others for help, which was an interesting finding. Their meanings of experiencing a problem because of the role change refer to an individual process that should be solved alone.

Support to Students

Making an impact on students is the main goal of teaching. Frustrations of pre-service teachers about learning outcomes from the students are observable in the meanings of the participants:

My first efforts in teaching did not sound good to me as I could not motivate the students to participate in the activities. Later, I figured out what moves were necessary to keep the things going. However, I suspect that I will make a perfect teacher very soon. (Zafer)

After my first teaching session, I asked my mentor about my teaching. She gave me advice on my eye contact, posture, and some other psychical things. She did not utter a word about anything scientific. After that, I decided to regulate my own teaching in a way. (Sema)

I know I have to work hard to improve my teaching. I get nervous in front of the students. Not because I do not know the subject matter, but I think it is a matter of ability to move from theory to practice. (Belma)

Tensions about support to students seemed to stem from some personal and professional issues. Some novice teachers sounded unsure of their ability to teach and a significant part of this concern comes from linking theory to practice. They perceive teaching as a scientific process in which theoretical knowledge is transferred into practice. As for coping strategies, Zafer was quite interested in motivating students to cooperate in the classroom activities and believed that it was really hectic for him. When asked about this, he said:

I tried to convert the well-known activities and techniques into games and I did it. This time, everything went better, though not the best according to my criteria. I did not ask my mentor for anything, I do not know why but I did not.

Another participant, Serap, initially thought that she could resolve the tension with the help of her mentor:

I sometimes find myself shuttling between my mentor and my supervisor as their beliefs about teaching are poles apart. As I am in the school for my practice, I choose to comply with my mentor to survive there.

In the beginning, Serap said that she tried to do what her mentor did in the classroom. Later, she changed her mind and wanted to make a useful impact on students by coming up with new methodologies:

The experienced teachers do not know much about contemporary methods and techniques of teaching. They just follow the Teacher's Book and do nothing different, which really bores the students in the classroom. After a period of hesitation, however, I used new ways of teaching. The students enjoyed my class, I am sure of that. (Serap)

Serap's decision was very significant in achieving agency. Despite the power inequality between her and her mentor, she was able to do something to support her students. She did not do what many teachers did, but instead highly valued the theoretical knowledge she received at university and developed a sense of practical knowledge. This action has also a lot to do with the issue of learning to teach.

Conceptions of Learning to Teach

Pre-service teachers are given theoretical knowledge during their undergraduate education at universities in Turkey, which they can then put into practice when they start their internships. This period represents a time when novice teachers suffer from conflicts between what was taught at the teacher education institutions (universities in Turkey) and teaching performance at the target institutions. The gaps between theory and practice, between the supervisor and mentor, and between the individual way of teaching and the mentor's way result in different conceptions of learning to teach. Most participants in this study stated that they suffered from the proficiency levels of experienced (old) teachers, the gap between the teacher education institutions and reality of schools:

Most of the teachers do not know about the latest theoretical knowledge. They do not want to learn anything new. I do not know what I will do when I am a teacher in the near future. Really, time will tell. (Selim)

In another entry, Selim added the following thoughts:

I had a problem with the vice director of the school. When I was talking about theoretical issues I studied at the university, he just stopped me and said "This kind of knowledge does not work here." I could not say anything.

Other participants stated:

The first day of my observation at school was like a shock to me. I thought what I had learnt from the books were useless. That is a pity. However, I believe that there must be a good way of using my knowledge in schools. I want to try that no matter how challenging it is. (Sema)

The things I have learnt at university do not apply to the real life in schools. Teachers do not take the theoretical knowledge into consideration. They act as they like. I also could not do all I wanted to do. I feel a bit guilty about that. (Canan)

Some participants referred to their relations with mentors:

My mentor does not care what I am doing. Once I asked her for feedback on my teaching, she just smiled and said that I was OK. I do not understand what OK means. Despite my insistence, she did not elaborate on it. She did not give me detailed feedback. How could I know if I am learning to teach? (Selim)

My mentor does not like talking to me. She rather prefers to drink tea and rest during the breaks. (Sema)

Similarly, most of the participants complain about the indifference of the mentors. Only one of them (Belma) stated that she talked to her mentor and that her relations with the mentor were beneficial. She was able to interact with her mentor in a positive way.

Novice teachers state that their tensions about different conceptions of learning to teach are more severe than the others. Especially during the focus group interview, they all stated that they cannot accept that their four-year undergraduate education period was useless. Some participants, like Serap, who decided to stick with contemporary methods, used some tactics to avoid the severe results of the tensions and took actions against them:

Some friends accepted everything as is and just went on teaching as their mentors advised them to do. I remembered that my supervisor at the university could help me with it. I talked to him and he told me that I should do something suitable for the context. He said there is no common solution for the tensions I experience. I immediately adopted this stance. (...) For example, I changed my way of teaching, activities, etc. from class to class. It was big help to me. (Sema)

The frustration Sema lived was serious and her solution partially helped relieve her despair. Canan, on the other hand, tried talking to her mentor and asked for help. She said this cooperation with the mentor lasted about two weeks, after which she felt better. She went back to the books she studied at the university. She drew some conclusions useful for her teaching:

I have learnt that teaching is very difficult. If my students understand that I am trying hard for them, they change a little. Some students tend to cooperate to make me feel better. I must admit I cannot do everything by the book, but trying makes me happier. I think I will learn till the last day of my teaching. (Canan)

In contrast, Selim did not consult anyone:

I just followed the Teacher's Book while teaching and I thought the information in that book was ready for my use. I believe it did work. When I combine theoretical knowledge from university with the Teacher's Book, I reach some good ways of teaching.

Selim's case is about not taking any risks if there are some practical notes like the Teacher's Book. He tended to negotiate the program and strictly applied the theory he studied at the faculty. Canan also felt safe by complying with theoretical knowledge. Their strategies had some actions but not resistance to anything. Negotiating the mentor or the supervisor appears to be a matter of power as the pre-service teachers need to obey the instructions of their supervisors as well as their mentors. In addition, Belma added that if pre-service teachers do not cooperate with the school administration, they feel very lonely in the schools, offering a reminder that the school administration is another power holder in the faculty-school partnership period.

Discussion and Conclusion

The interplay between the self and the profession can be seen as a product of the dichotomy between being human and being a teacher (Shapiro, 2010). The pre-service teachers suffer the transition period from the role of being a student to being a teacher. In this period, they try to negotiate the personal and social identities of being a teacher while identifying as a student. This study displayed a strong case of tensions about learning to teach. In a study by Yayli (2008), the dichotomy between the theory and practice created a mentor-supervisor dichotomy as a byproduct. This particular dichotomy seems to appear in Turkish settings and pre-service teachers seek strategies to overcome this type of tension.

Teachers develop strategies of their own to address all types of tensions in their epistemological development. This study corroborates the findings in the literature (Yayli, 2008; Pillen et al., 2013a, Sachs, 2001; Sexton, 2008). Pre-service teachers mostly prefer to negotiate the role (mentor or supervisor), the power, and the program. Some of them do nothing to evade the tension, though this may be because they are emotionally influenced (Admiraal et al., 2000). Others try to avoid the psychological and physical states disturbing them. Four of the coping strategies

derived from the literature by Pillen et al. (2013b) were observable in this study: a) searching for a solution yourself, b) asking for help by speaking about the tension with a significant other, c) receiving help without taking the initiative, and d) putting up with the situation. Some participants took the initiative, which was important for agency achievement. Their fifth strategy (receiving help without asking for it), however, was not traced in the stances and meanings of the participants. For the context of this study, the participants did not receive any help from significant others without asking for it. This finding could be said to corroborate Pillen et al. (2013b), as in that study only 1% of total frequencies across all tensions was resolved through this fifth strategy. Cabaroglu (2014) found that novice teacher turn to other people around them and try to get help as a result of a conflict. However, the people around them do not offer help unless asked. Thus teacher educators, supervisors, and mentors should be available for pre-service teachers and offer help even when they do not seem to need it. Continuous mediation will be very helpful as some novice teachers might be shy to ask for help. This will also help novice teachers take actions and achieve agency in the specific contexts of teaching. As an important source of mediation processes, instructors at faculties of education should be instructed in the latest teacher education theories. Pre-service teachers believe that some university instructors lack the necessary skills to support them with practical knowledge and contemporary methods and techniques (Aykaç, 2016).

Pillen et al. (2013a) noted that teachers learn from tensions, which is in line with the findings from this study. For example, one participant, Canan said that, "You can learn even from the worst experiences." Most of the participants believe that anything lived in the community of the practice, whether good or bad, will support their teaching.

This qualitative study was conducted with eight pre-service teachers of Turkish language at a state university in Turkey. It also focused on the strategies of the participants to internalize the nature of coping with tensions in communities of practice to achieve agency in professional identity formation. Despite its limitations, the findings can contribute to the field of teacher education for local and international settings. Similar studies in various contexts might provide the literature with useful perspectives to develop teacher education programs in which theory building processes and practical experience can meet successfully. One stance made by a participant could contain several tensions, which is why the intermingled nature of the tensions should not be underestimated while considering the findings from similar studies. Allen (2009) stated that prospective teachers tend to value practical knowledge more when they become practitioners at schools, though they value both theory and practice during their internships. Thus, longitudinal studies tracing teachers both in pre-service and in-service terms could reveal epistemological processes in the formation of multiple identities with respect to tensions and teacher agency.

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Türkçe Öğretmeni Adaylarının Öğretmen Etkinliği Oluşturma Yolunda Gerginliklerle Başa Çıkma Stratejileri

Atıf:

Yayli, D. (2017). Coping strategies of pre-service teachers of Turkish with tensions in achieving agency. *Eurasian Journal of Educational Research*, 68, 187-202, <http://dx.doi.org/10.14689/ejer.2017.68.10>

Özet

Problem Durumu: Öğretmen kimliği gelişiminin önemli bir parçası öğretmen gerginlikleridir. Öğretmenlerin kendi istedikleri ile mesleğin gerektirdikleri arasında gerçekleşen bu çatışma öğretmenler için ciddi sonuçlar doğurabilmektedir. 'Öğretmen gerginliği' kavramı son yıllarda sıkça çalışılmış ve öğretmenlerin yaşadıkları gerginliklerin öğretmen yetiştirme alanyazınında önemli bir yer edindiği görülmektedir. Alanda gerçekleştirilen bir çalışma sonucunda öğretmen gerginlikleri üç ana başlık altında toplanmıştır:

- (1) Öğrenci rolünden öğretmen rolüne geçiş
- (2) Öğrencilere sunulan katkı ile istenen katkı arasındaki çatışma
- (3) Öğretmeyi öğrenmeyle ilgili çelişkili kavramlar

Aynı çalışma ekibi tarafından yapılan başka bir çalışmada ise yeni öğretmenlerin bu gerginliklerden kurtulma stratejileri beş başlık altında ele alınmıştır:

- (1) Kendi başına bir çözüm bulmak
- (2) Yardım istemek ya da önemseydiği biriyle gerginlik hakkında konuşmak
- (3) Kendi başına harekete geçmeyip yardım almak
- (4) Duruma katlanmak
- (5) Yardım istemeden birinden yardım almak

Öğretmen yetiştirme süreçleri gerginlikler ve onlarla mücadele süreçleriyle doludur. Bunlar öğretmelerin öğrenme süreçlerine katkıda bulunur ve öğretmen kimliği geliştirmeye yardımcı olur. Öğretmenler ve öğretmen adayları kendilerine sunulan yapı ile kendi etkinlikleri arasında bir denge kurmak gereksinimi hissederler. Öğretmen etkinliği kavramı, öğretmenin içinde bulunduğu bağlamı, şartları ve görevleri düzenleyebilmesiyle ilgilidir. Kendine verilen şartları düzenleyen öğretmenler, öğretme ortamlarını daha iyi bir duruma getirmek için harekete geçerler. Bu harekete geçme eylemi öğretmen etkinliği ile ilgilidir. Öğretme ortamlarındaki gerginlikleri yaşayan öğretmenler bunlarla mücadele edebilmek için bazı kararlar alırlar ve harekete geçerler. Yani öğretmen etkinliği için bir süreç oluştururlar. Türkiye bağlamında yürütülen çalışmalarda gerginlik konusu ele alınmış olsa da, bu gerginliklerle başa çıkma stratejileri ve bunların nasıl bir

öğretmen etkinliği yarattığı konuları araştırılmamıştır. Bu yüzden bu çalışma alanyazındaki bir eksikliği giderecektir.

Araştırmanın amacı: Bu çalışmanın amacı, hizmet öncesi öğretmenlerin yaşadıkları gerginlikleri nasıl çözdüklerini ve bu amaçla harekete geçerek nasıl bir öğretmen etkinlik içine girdiklerini belirlemektir.

Yöntem: Bu çalışma, sembolik etkileşimci bir yöntemle öğretmen adaylarının oluşturdukları ortak anlamların izini süren nitel bir çalışmadır. Çalışmaya güz dönemindeki okul gözlemleri sırasında bazı konularda çatışma yaşadıklarını belirten sekiz hizmet öncesi Türkçe öğretmeni gönüllü olarak katılmıştır. Bu yüzden çalışmanın amaçlı bir örnekleme sahip olduğu söylenebilir. Çalışmaya katılan sekiz öğretmen adayından altısı kadın, ikisi erkektir ve katılımcılar 21-23 yaş aralığındadır. Çalışmanın verileri yansıtıcı günlükler, yarı yapılandırılmış görüşme formları ve bir odak grup görüşmesi yoluyla toplanmıştır. Toplanan nitel veriler önceden belirlenen gerginlik türleri ve korunma stratejileri çerçevesinde incelenmiştir. İnceleme sırasında hizmet öncesi öğretmenlerin ifadelerinde yer alan ortak anlamlar belirlenmiş ve tartışılmıştır. Bu anlamaları desteklemek amacıyla, bulgular içinde katılımcıların doğrudan ifadelerine yer verilmiştir. Katılımcıların gerçek kimlikleri yerine takma adlar kullanılmıştır. Çalışmanın geçerliği için her aşamada alandan deneyimli bilim insanlarına danışılmıştır. Çalışmada kullanılan amaçlı örneklemin de iç ve dış geçerliği desteklediği söylenebilir. Elde edilen kodlar ve temaların güvenilirliğini belirlemek amacıyla başka bir bilim insanı tarafından aynı veriler kodlanmış ve %94 oranında bir mutabakat sağlanmıştır. Geriye kalan bölüm için uzlaşma yoluna gidilmiştir.

Bulgular: Bu çalışmadan elde edilen bulgular daha önce belirlenen öğretmen gerginlik türleri alt başlıkları çerçevesinde sunulmuştur. İlk olarak, öğretmen adaylarının öğrencilikten öğretmenliğe rol değişimi onlarda ciddi gerginlik yaratmaktadır. Öğretmenlik mesleğini sorumluluk olarak anlamlandıran hizmet öncesi öğretmenlerden biri çözümü kendisi bulmaya çalışmış ve kendine terapi uygulamaya karar vererek bir etkin olma örneği göstermiştir. Diğerleri ise hiçbir şey yapmadan ya durumu kabullenmiş ya da önemli bir etkinlik göstermeden gerginliğin çözülmesini beklemişlerdir.

İkinci gerginlik türü olan öğrencilere verilen destekle ilgili çatışma birkaç katılımcı tarafından dile getirilmiştir. Bazı öğretmen adayları öğretme kapasiteleri konusunda emin olamamaktadır. Bunun da genel anlamda kuramdan uygulamaya geçişle ilgili olduğunu belirtmişlerdir. Onlar için öğrencilere destek sağlamak bildiklerini uygulamaya dökülebilmek anlamına gelmektedir. Çatışmayı engellemek için danışman öğretmenine başvuran bir katılımcı verimli bir destek alamadığı için kuramsal bilgiye yaslanmaya karar vermiştir. Üniversitede öğrendiklerini uygulamaya karar veren bu öğretmen adayı için öğretmen etkinliği oluşturduğu yorumu yapılabilir. Bir başka öğretmen adayı ise durumu kabullenmekten başka bir şey yapmamıştır.

Son olarak, öğretmeyi öğrenmeyle ilgili kavramlar konusunda katılımcıların çokça gerginlik yaşadıkları belirlenmiştir. Bu gerginlikler genel anlamda kuram-uygulama, fakülte-okul ve bireysel öğretme yolu-danışman öğretmenin yolu çatışmalarından

kaynaklanmaktadır. Uygulama sürecinde öğretme konusunda yeni şeyler öğrenen aday öğretmenlerin bir kısmı kuramsal bilgiyle uygulama bilgisini buluşturamamakta ve bilgiyi sadece kuramsal bağlamda anlamlandırmaktadır. Katılımcıların çoğu danışman öğretmenlerin ilgisizliğinden şikâyetçidir. Gerginliklerini çözmek için onlardan yardım alamamaktadırlar. Bu katılımcılardan biri öğretmen etkinliği denebilecek bir kararla üniversitedeki sorumlu öğretim elemanından yardım almaya karar vermiş ve bu konudaki gerginliğini yenmeyi başarmıştır. Bu gerginlik konusunda Türkçe öğretimi programına bağlı kalmaya karar veren bir katılımcı öğretmen kılavuz kitabına yönelmiştir.

Çalışmanın ortaya koyduğu önemli bir bulgu ise hizmet öncesi öğretmenlerinin yardım istemedikleri takdirde yardım alamadıklarıdır. Yani okullardaki deneyimleri sırasında öğretmen adaylarına yardım teklif eden olmamıştır. Öğretmen adayları yardımı ancak talep ettiklerinde alabilmişlerdir.

Sonuçlar ve Öneriler: Öğrenci olmak ile öğretmen olmak arasındaki çatışma öğretmen kimliğinin oluşması açısından kritik öneme sahiptir. Öğrencilere katkıda bulunma ve öğretmeyi öğrenme de aynı şekilde bu sürecin önemli gerginliklerindedir. Öğretmen adayları bu gerginliklerden kurtulmak için bazı yollara başvurmaktadır. Ancak yardım istemedikleri sürece kendilerine yardım teklif edilmediği ortaya çıkmıştır. Bu durum öğretmen yetiştirme süreçlerinin verimi için çok önemlidir. Öğretmen adayları yardım isteme konusunda çekingen davranışlar bile olası gerginlikleri giderme konusunda kendilerine sürekli destek sunulmalıdır. Bu, etkili bir fakülte-okul işbirliğiyle ve fakültelerdeki sorumlu öğretim elemanlarının donanımıyla doğrudan ilişkilidir. Gerginlikleri sürecinde yalnız bırakılan öğretmenlerin öğretmeye yönelik olumsuz duygu ve tutum geliştirme olasılığı onların gelecekteki öğretme süreçlerini olumsuz yönde etkileyecektir. Öğretmen gerginlikleri, gerginliklerle başa çıkma stratejileri öğretmen etkinliği yaratması açısından önemli fırsatlar olarak görülmelidir. Ayrıca bu gerginlikler ileride olumlu sonuçlar yaratacak öğrenme fırsatlarıdır.

Anahtar Sözcükler: Öğretmen eğitimi, öğretmen gerginlikleri, başa çıkma stratejileri, öğretmen etkinliği.



Perceptions Of Gifted And Non-Gifted Students Related To Their Levels Of Self-Actualization

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ABSTRACT

Purpose: Self-actualization is understood as an effort to develop a level to which one aspires. Gifted individuals are expected especially to be more likely to reach this level than normal individuals of the same age. **The Purpose of** this study is to determine the self-actualization perception levels of students at BİLSEM, which is within the Ministry of National Education, and those who did not attend BİLSEM, **Research Methods:** This study utilizes squantitative research methods in which descriptive methods were used to determine and compare self-actualization perceptions of gifted and non-gifted students.

Its sample was chosen by purposeful sampling and was composed of 253 students in total, 115 of which attended BİLSEM and 138 of which didnot attend BİLSEM. In the scope of this study, the "Self-Actualization Scale" developed by Battal and Şan (2010), was used. **Findings:** As a result of the study, the perception levels of the gifted students are higher than non-gifted students in terms of self-actualization, social relations, creativity, critical thinking, and emotional integrity. In addition, it was also observed that the students who attended pre-school have higher perceived levels of self-actualization. **Implications for Research and Practice:** According to the results, without overlooking the equality of opportunities in education, works that will increase the self-actualization perceptions of students who cannot go to BİLSEM should be included by means of education programs and concealed curricula. Future studies could investigate why perceived levels of self-actualization of gifted students were higher than those of non-gifted students.

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Introduction

The world presents development through a process of change. This process is provided through the pathfinders of economical, technological, and political matters. If a change is to be initiated in a field, it should be implemented devotedly by predicting the reflections of the past formations onto present-day social structures. Upon studying historical developments throughout society, it can be seen that the individuals who shaped such initiatives were "gifted people," possessing features such as leadership, productivity, and efficiency; the characteristics of gifted individuals foster their abilities to accept and solve situations around them (Uzun, 2004).

Gifted individuals are not necessarily different than normal people, but their characteristics, which are present in everybody, differ in terms of distribution, frequency, timing, and composition. Additionally, they are emphasized as individuals with a combination of superior abilities, different perspectives, creative thinking skills, and a responsibility of duty in comparison to their peers. (Akarsu, 2001; Renzulli & Reis, 1985) These individuals need comprehensive education opportunities and services that cannot be provided by normal programs (Renzulli and Reis, 1985; Cit: Gokdere & Cepni, 2004). It is a necessity to guide these individuals towards the specializations they express starting in childhood so that they could make use more of their potential (Davasligil, 2012). Gifted individuals need to be guided in accordance with the needs of society. They need a framework, such as Maslow's hierarchy of needs to integrate their relationships with experiences (Clarck, 2008). Maslow's hierarchy of needs focuses on five basic categories: physiological needs, safety needs, the need for love and belonging, the need for esteem, and the need for self-actualization. The needs are addressed hierarchically with the belief that individuals ascend to an upper category of needs after fulfilling their needs at the bottom. (Akbaba, 2006) The need for self-actualization, which is at the top, counts as the basic driving force of a healthy human, and was first documented in the writings of Carl Jung (Kuzgun, 1972). Self-actualization is realized through the following competences: the ability to clearly see the truth, to see oneself and others as they are, to accept, to be sufficient to oneself, to not be partisan, to be independent, to constantly search for developments, to show empathy and mercy towards others, to make friends, to act democratically, to distinguish the purpose from the means, to see the humorous side of events, to be creative, to not resist against acculturation, and to be determined to solve problems (Ruf, 1998; Cit: Boran & San, 2013). Self-actualization requires critical thinking to create innovative ideas, to be nice and friendly in social relations, and to have emotional integrity. Self-actualization is understood as an effort to develop, as a motive guiding human behaviors, as well as a level to which one aspires (Kuzgun, 1972). Gifted individuals are expected especially to be more likely to reach this level than normal individuals of the same age. In addition, the studies of Pufal-Struzik (1999) and Hebert and McBee (2007) stated that gifted individuals express higher levels of self-actualization than average learners (Cit: Boran & San, 2013).

In studies that compare students who have been deemed as gifted to normal students (Kaya, Kanik & Alkin, 2016; Arseven & Yesiltas, 2016; Bahar, Kaya & Bahar, 2016; Tascilar, 2016; Tortop, 2015; Kaya, Erdogan & Caglayan, 2014; Kanli & Emir, 2013; Yildiz, Baltaci, Kurak & Guven, 2012; Kanli, 2011), it is seen that the students were compared in terms of emotional intelligence levels, communicative abilities, learning styles, approaches and preferences towards reading, self-regulating abilities for learning science, school life qualities and friendships, levels of success and creative thinking, the capacity to use problem-solving strategies, perfectionism, their levels of depression and anxiety, and planning abilities. However, no such study related to their level of self-actualization has been encountered.

The aim of this study is to determine the perceived levels of self-actualization of students at BİLSEM, which is within the Ministry of National Education, and those who do not attend BİLSEM, as well as to compare the self-actualization perception levels of these students in accordance with specific demographic features.

Method

Research Design

This study utilized quantitative research methods in which descriptive methods were used to determine and compare the self-actualization perceptions of gifted and non-gifted students. They were prepared in accordance with the survey model. The aim of survey research is generally to create a description by photographing a present case relevant to the subject of the research (Buyukozturk, Kilic-Cakmak, Akgun, Karadeniz & Demirel, 2008).

Research Sample

The students who attended BİLSEM, located in the Sakarya city center, and those who did not attend BİLSEM in the 2015-2016 school year compose the population of this study. Its sample was chosen by purposeful sampling and composed of 253 students in total of which 115 were BİLSEM students and 138 were not. Purposeful sampling study enables the ability to choose cases that are rich in information to investigate in depth (Buyukozturk, Kilic-Cakmak, Akgun, Karadeniz & Demirel, 2008). However, upon acquiring the normality distribution of the data, the information showed extreme values that were filtered. Therefore, the analysis utilized data from 244 participants, of which 107 attended BİLSEM and 137 did not. Demographic features of the students participating in the study are provided in Table 1.

Table 1.*Demographic Features of Gifted and Non-Gifted Students*

		<i>Participants' Status of Attending BİLSEM</i>		
		<i>Those not attending BİLSEM</i>	<i>Those attending BİLSEM</i>	<i>Total</i>
Gender	Female	101	44	145
	Male	36	63	99
Status of Preschool Education	Yes	76	98	174
	No	61	9	70
Attitudes of Parents	Overprotective	20	17	37
	Overly Oppressive and Authoritative	7	4	11
	Perfectionist	22	12	34
	Inconsistent	12	4	16
	Fully Liberal	9	6	15
	Democratic	65	63	128
Number of Siblings	Only Child	7	27	34
	2 Siblings	37	44	81
	3 Siblings	58	22	80
	More than 3	34	14	48
Educational Level of Mother	Primary School	117	29	146
	High School	17	38	55
	University	3	40	43
Educational Level of Father	Primary School	78	5	83
	High School	50	37	87
	University	9	65	74
Income level of Family	Less than 2000 TL	88	11	99
	2001-3000 TL	20	19	39
	3001-4000 TL	18	26	44
	4001-5000 TL	4	26	30
	5000 and More	7	22	29

Research Instrument and Procedure

In the scope of this study, the "Self-Actualization Scale" developed by Battal and Şan (2010) was used. The Self-Actualization Scale is composed of four sub-dimensions: emotional integrity, critical thinking, social relations, and creativity, as well as 30 articles. All the dimensions of Emotional Integrity (4,14,18,19,21,22,24,25,27,28,29), Critical Thinking (9,13,17,20,23,26), Social Relations (1,2,3,5,6,7,10), and Creativity (8,11,12,15,16,30) contain different numbers of articles.

The scale was formed as a 4-point Likert scale. The articles forming the scale were graded from 1 to 4 as "Always," "Mostly," "Sometimes," and "Never." While Cronbach Alpha reliability value was determined as 0.0818 for the reliability validity of the scale, Cronbach Alpha was determined as 0.695 for the "self-actualization levels" of the gifted student's devised by Boran and Şan (2013), and Cronbach Alpha for the scale for this study was calculated as 0.749.

Data Analysis

Demographic features such as gender, family income, familial attitudes and educational background, number of siblings and preschool education were included in the personal information form. Students' levels of self-actualization were studied in terms of these features. The Mann-Whitney U and Kruskal Wallis H non-parametric tests were used, since the data was not distributed normally.

Results

The results of the Mann-Whitney U and Kruskal Wallis H non-parametric tests, which were used to determine the significance according to the demographic features of the self-actualization levels of both sets of students, are displayed in the following tables.

Table 2
 Mann-Whitney U Scores Related to Participants' Perceived Levels of Self-Actualization and Sub-Dimensions According to Gender of Participants.

	Gender	N	Arithmetic Average	Z Value	P
Perceived Level of Self- Actualization	Female	145	113.05	-2.532	0.011*
	Male	99	136.34		
Social Relations	Female	145	118.56	-1.064	0.287
	Male	99	128.28		
Critical Thinking	Female	145	110.38	-3.272	0.001*
	Male	99	140.26		
Creativity	Female	145	112.40	-2.719	0,007*
	Male	99	137.30		
Emotional Integrity	Female	145	120.75	-,471	0.638
	Male	99	125.07		

*p<0.05

According to Table 2, the self-actualization perception levels of the participants as well as the critical thinking and creativity levels differ significantly according to their genders (p<0.05), whereas no such difference was observed according to their genders in terms of social relations and emotional integrity (p>0.05). While the average of the male students' perceived self-actualization levels is 136.34, the average

of the female students' perceived levels is 113.05. Furthermore, the average of critical thinking skills of the male students is 140.26, and the average of the female students is 110.38. The creativity score average of the male students is 137.30, and the average of the female students is 1124.0. In conclusion, the perception levels of self-actualization, creativity, and critical thinking of the male students were found to be higher than those of the female students.

Table 3.

Mann-Whitney U Scores Related to Participants' Perceived Levels of Self-Actualization and Sub-Dimensions According to Their Preschool Education

	<i>Preschool Education</i>	<i>N</i>	<i>Arithmetic Average</i>	<i>Z Value</i>	<i>p</i>
Perceived Level of Self-Actualization	Yes	174	134.71	-4.263	0.000*
	No	70	92.15		
Social Relations	Yes	174	131.62	-3.204	0.001*
	No	70	99.84		
Critical Thinking	Yes	174	123.63	1	2
	No	70	119.69	-.397	0.691
Creativity	Yes	174	134.61	3	4
	No	70	92.39	-4.246	0.000*
Emotional Integrity	Yes	174	130.48	5	6
	No	70	102.66	-2.796	0.005*

* $p \leq 0.05$

According to Table 3, the students' perceived levels of self-actualization and social relations as well as creativity and emotional integrity differ significantly according to their preschool background ($p \leq 0.05$), whereas no such difference was observed according to their preschool background in terms of critical thinking ($p > 0.05$). According to these findings, the average of the perceived levels of self-actualization perception levels for students with a preschool background is 134.71, while the average of the students with no preschool background is 92.15. In addition, the average perceived level of the students with a preschool background related to social relations is 131.62, whereas the average perception level of the students with no preschool background is 99.84. The average creativity score of the students with a preschool background is 134.61, whereas the average creativity score of the students with no preschool background is 92.39. The average score of the students with a preschool background related to the perception of emotional integrity is 130.48, whereas the average of those with no preschool background is 102.66.

Table 4

Kruskal Wallis H Scores Related to Participants' Perceived Levels of Self-Actualization and Sub-Dimensions According to the Attitudes of Their Parents

Attitudes of the Parents	N	Average Rank	χ^2	df	p
Overprotective	37	116.05	8.800	5	0.117
Overly Oppressive and Authoritative	11	74.77			
Perfectionist	34	122.35			
Inconsistent	16	102.94			
Fully Liberal	15	107.23			
Democratic	128	129.91			

*p≤0.05

As seen from Table 4, there is no statistically significant difference in self-actualization perception levels of the students participating in the study and its sub-dimensions according to the perceived attitudes of their parents ($P = .118 > 0.05$). In this respect, it can be said that the attitudes of the parents play no role in the perception related to individuals' self-actualization levels.

Table 5.

Kruskal Wallis H Scores Related to Participants' Perceived Levels of Self-Actualization According to Number of Siblings

Number of Siblings	N	Average Rank	χ^2	df	p
Only Child	34	144.34	13.146	3	0.004*
2 Siblings	81	136.84			
3 Siblings	80	106.58			
More than 3	48	106.84			

*p≤0.05

As seen in Table 5, there is a significant difference in the students' perceived levels of self-actualization according to the number of siblings ($P < .005$). It is seen that the average of the perceived levels of the students (144.34) who are only children is higher than those with siblings. However, no significant difference was found according to the number of siblings in the analysis related to the sub-dimensions of the scale.

Table 6

Kruskal Wallis H Scores Related to Participants' Perceived Levels of Self-Actualization and Sub-Dimensions According to the Educational Background of Their Mothers

	<i>Educational Level of Mother</i>	<i>N</i>	<i>Average Rank</i>	χ^2	<i>df</i>	<i>p</i>
Perceived Level of Self-Actualization	Primary School	147	101.86	33.562	2	0.000*
	High School	54	145.00			
	University	43	164.81			
Social Relations	Primary School	147	112.33	8.806	2	0.012
	High School	54	131.51			
	University	43	145.95			
Critical Thinking	Primary School	147	110.55	11.142	2	0.004*
	High School	54	136.73			
	University	43	145.49			
Creativity	Primary School	147	100.74	36.199	2	0.000*
	High School	54	150.02			
	University	43	162.31			
Emotional Integrity	Primary School	147	109.57	13.671	2	0.001*
	High School	54	135.19			
	University	43	150.76			

*p≤0.05

As seen in Table 6, the scores from the sub-dimensions of critical thinking, creativity, and emotional integrity excluding the self-actualization levels scale and the sub-dimension of social relations differ significantly according to the educational background of the mother. It is seen that the average of the perceived levels of self-actualization for students with university-educated mothers is higher: 164.81. Furthermore, the average of their critical thinking scores is 145.49, their creativity average is 162.32, and their emotional integrity average is 150.76, all of which are higher compared to students whose mothers were primary or high school graduates.

Table 7

Kruskal Wallis H Scores Related to Participants' Perceived Levels of Self-Actualization and Sub-Dimensions According to the Educational Background of their Fathers

	<i>Educational Level of the Father</i>	<i>N</i>	<i>Average Rank</i>	χ^2	<i>df</i>	<i>p</i>
Perceived Level of Self-Actualization	Primary School	83	83.16	44.111	2	0.000*
	High School	87	131.35			
	University	74	156.22			
Social Relations	Primary School	83	93.66	22.019	2	0.000*
	High School	87	133.09			
	University	74	142.41			
Critical Thinking	Primary School	83	95.86	20.410	2	0.000*
	High School	87	128.66			
	University	74	145.14			
Creativity	Primary School	83	91.73	28.976	2	0.000*
	High School	87	127.13			
	University	74	151.57			
Emotional Integrity	Primary School	83	97.73	18.630	2	0,000*
	High School	87	126.39			
	University	74	145.72			

*p≤0.05

As seen in Table 7, the scores from the self-actualization perception scale and all its sub-dimensions differ significantly according to the educational background of the father (P<.005). It is seen that the average of the perceived levels of self-actualization of the students with university-educated fathers is higher: 156.22. Furthermore, their social relations average is 142.41, their critical thinking average is 145.14, their average creativity score is 151.57 and their average emotional integrity score is 145.72, all of which are higher compared to students whose fathers were primary or high school graduates.

Table 8*Kruskal Wallis H Scores Related to Participants' Perceived Levels of Self-Actualization and Sub-Dimensions According to Family Income*

	Average Income	N	Average Rank	χ^2	df	p
Perceived Level of Self-Actualization	Less than 2000 TL	99	99.53	16.701	4	0.002*
	2001-3000 TL	39	131.26			
	3001-4000 TL	44	138.75			
	4001-5000 TL	30	143.20			
	5000 and More	29	130.60			
Social Relations	Less than 2000 TL	99	103.29	14.078	4	0.007*
	2001-3000 TL	39	142.87			
	3001-4000 TL	44	141.06			
	4001-5000 TL	30	121.67			
	5000 and More	29	120.93			
Critical Thinking	Less than 2000 TL	99	111.34	4.194	4	0.380
	2001-3000 TL	39	124.06			
	3001-4000 TL	44	125.93			
	4001-5000 TL	30	138.37			
	5000 and More	29	124.41			
Creativity	Less than 2000 TL	99	103.98	12.849	4	0.012
	2001-3000 TL	39	122.87			
	3001-4000 TL	44	128.01			
	4001-5000 TL	30	148.93			
	5000 and More	29	137.05			
Emotional Integrity	Less than 2000 TL	99	105.95	9.742	4	0.045
	2001-3000 TL	39	124.40			
	3001-4000 TL	44	139.72			
	4001-5000 TL	30	138.03			
	5000 and More	29	121.79			

*p≤0.05

As seen in Table 8, the scores from the self-actualization perception scale and its social relations sub-dimension differ significantly according to the average income of the families ($P<.005$). It is seen that the average of the perceived levels of self-

actualization of the students stating their families' income as 4000-5000 TL is higher, at 143.20, and the social relations average of the students stating their families' income as 2000-3000 TL is also elevated, at 142.87, compared to students whose families had other income levels. However, no significant difference can be seen in terms of average critical thinking, creativity, and emotional integrity scores.

Table 9

Mann-Whitney U Scores Related to Participants' Perceived Levels of Self-Actualization and Sub-Dimensions in Accordance with Attending BİLSEM

	Attending BİLSEM	N	Arithmetic Average	Z Value	p
Perceived Level of Self-Actualization	Not Attending	137	95.38	-6.796	0.000*
	Attending	107	157.22		
Social Relations	Not Attending	137	107.68	-3.738	0.000*
	Attending	107	141.48		
Critical Thinking	Not Attending	137	108.33	-3.576	0.000*
	Attending	107	140.64		
Creativity	Not Attending	137	95.72	-6.739	0.000*
	Attending	107	156.79		
Emotional Integrity	Not Attending	137	103.61	-4.748	0.000*
	Attending	107	146.69		

*p≤0.05

As seen in Table 9, the perceived levels of self-actualization of the students differ significantly according to whether they were attending BİLSEM or not (p≤0.05). According to the findings, the average of the self-actualization perception levelsof the students who attended BİLSEM is 157.22, and the average of the students who did not attend BİLSEM is 95.38. Furthermore, the social relations average score of the students who attended BİLSEM is 141.48, the critical thinking average score is 140.64, the creativity average score is 156.79, and the emotional integrity average score is 146.69. The social relations average score of the students who did not attend BİLSEM is 107.68, the critical thinking average score is 108.33, the creativity average score is 95.72, and the emotional integrity average score is 103.61. In this respect, it is observed that the perception levels of the students determined as gifted are higher than the non-gifted individuals in terms of self-actualization, social relations, creativity, critical thinking, and emotional integrity.

Discussion and Conclusions

The perceived levels self-actualization of the 107 students in the age range of 12-16 years old who attended Sakarya Science and Art Center (BİLSEM) in the 2015-2016 school yearand the 137 students who did not attend BİLSEM were studied in accordance with specific demographic features in this study. According to the findings, it is seen that the perceived levels self-actualization, social relations, critical thinking, creativity, and emotional integrity of the students who attended BİLSEM

were significantly higher than the students who did not attend BİLSEM. In the study by Kaya, Kanik, & Alkin (2016), it was found that the intelligence levels of gifted individuals are significantly higher than individuals who are stated as non-gifted, while there was not any significant difference in concerning social relations. In the self-actualization levels determination study on BİLSEM students by Boran and San (2010), the individuals who attended BİLSEM and were deemed gifted could portray themselves and perform the acts in its sub-dimension. In addition it can be seen from the studies of Reis and Renzulli (2004) that many studies have indicated that gifted children can be healthy, attractive, and active individuals in various fields, having strong personalities and social proficiency.

According to the results of the present study, considering gender from the demographic features, it is observed that male students stand out more at the levels of self-actualization as well as critical thinking and creativity, which are sub-factors of self-actualization. Oncu (2003) emphasized that gender has a significant difference on critical thinking, and Genc (2008) and Celik et al. (2009) underlined that females are better than males at critical thinking. In the study by Boran and San (2013), there was no significant difference at the level of self-actualization and its sub-dimensions based on gender. Moreover, in their study about gifted students, Topcu and Leana-Tascilar (2016) found that there was no significant difference in the motivations and self-esteem of the students according to gender. Pajares and Graham (1999) did not record any gender difference in their study with students who are gifted compared to those with normal intelligence levels. (Cit: Topcu & Leana-Tascilar, 2016)

It was determined in the study that the perceived levels of self-actualization level of those who are the only children in their family are higher. However, no significant difference was found in the sub-dimensions of the study. Although very few studies that focused on self-actualization were found in the literature, similar studies by Yuksekkaya (1995) and Yigit (2010) emphasized that children with no siblings have high self-esteem, which builds emotional integrity. This finding indicating that children with no siblings have high self-esteem compared to children with siblings (Cit: Masrabaci, 1994) is similar to the findings of the Rosenberg study. In conclusion, it can be assumed that the self-acceptance level of those with high self-esteem is higher (Yigit, 2010).

In the results, the levels of critical thinking, creativity, and emotional integrity of the students whose mothers are university graduates were higher, excluding the students' perceived levels of self-actualization and the social relations sub-dimension. Gulerce (1996) and Aydogan (2010) pointed out in their studies that the self-actualization levels of children improve as the mother's educational status changes. There was a significant difference in the levels of self-actualization and its sub-dimensions in accordance with the mother's educational status in the study by Boran and San (2013), as well.

Furthermore the levels of self-actualization perception and social relations, critical thinking, creativity, and emotional integrity of the students whose fathers are university graduates were higher. Yavuzer (1998) stated that, as the educational

status of the father, who is accepted as the authority of the family in society, increases, and the self-esteem of the child also increases. As the educational level increases the average income, it is believed that children are more confident, which affects their social relations.

Furthermore, the perceived levels of self-actualization were higher for the students whose families' income levels are close to the highest level of income, while the perceived levels of social relations were higher for the students whose families' income levels are medium. In the study of Boran and San (2013), there was a significant difference at the level of self-actualization and its sub-dimensions according to family income level. Ozmen et al. (2008) determined that the family income level leads to despair in social relations, and they will have higher hopes as the income level increases.

Additionally, it is seen that the students with a preschool background have higher perceived levels of self-actualization and social relations, creativity and emotional integrity compared to students with no preschool background, which shows us the importance of preschool education for individual development. Related to the variable of having a preschool education background, it was found in the master's thesis of Kale-Karaaslan (2012) that the average scores of the first graders with a preschool background are significantly higher in the Recognition of Emotions and Expressing of Emotions tests.

Conclusion

As a conclusion, within the framework of the findings related that the perceived levels of gifted students are higher than non-gifted students in terms of self-actualization, social relations, creativity, critical thinking, and emotional integrity. Teachers who organize educational curricula, at especially BİLSEM, could be informed in this respect, and the high perceived levels of the students could be guided towards creative and productive works in accordance with their goals through education programs. Furthermore, without overlooking the equality of opportunities in education, works that will increase the self-actualization perceptions of students who cannot go to BİLSEM should be included by means of education programs and concealed curricula.

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Üstün ve Üstün Olmayan Öğrencilerin Kendilerini Gerçekleştirme Düzeylerine İlişkin Algıları

Atf:

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Özet

Problemin Durumu: Üstün zekalıların toplumun ihtiyaçları doğrultusunda yönlendirilmeye ve toplum ile ilişkilerinin deneyimlerle bütünleştirilmesi için Moslow'un ihtiyaçlar hiyerarşisi gibi bir çerçeveye ihtiyaçları vardır. Fizyolojik ihtiyaçlar, güvenlik, sevgi ve aidiyet duygusu, saygı, kendini gerçekleştirme ihtiyacı olmak üzere beş temel kategoride incelenmiş ve insanın en alttaki ihtiyaçlarını karşılanmasının ardından bir üstteki ihtiyaçlar kategorisine doğru yöneleceği

belirtilmektedir. Maslow'un ihtiyaçlar hiyerarşisinde en üst düzeyde yer alan kendini gerçekleştirme; sağlıklı insanın davranışlarının temel yönetici gücü olarak sayılır. Kendini gerçekleştirme bir gelişme çabası, insan davranışlarını yöneten bir güdü olduğu kadar erişilmeye çalışılan bir gelişme düzeyi olarak da ifade edilmektedir. Özellikle üstün yetenekli bireylerde erişilmeye çalışılan bu gelişme düzeyinin kendi yaştlarındaki normal bireylerden daha fazla olması beklenmektedir.

Araştırmanın Amacı: Bu araştırma, üstün ve üstün olmayan öğrencilerin kendini gerçekleştirme düzeylerine ilişkin algılarının cinsiyet, okul öncesi eğitim, kardeş sayısı, anne baba tutumları, anne ve babanın eğitimi, ortalama gelir ve BİLSEM öğrencisi olma durumları gibi demografik özelliklerinin ölçeğin alt boyutlarına göre etkisinin belirlenmesi amacıyla gerçekleştirilmiştir.

Araştırmanın Yöntemi: Bu araştırma, üstün yetenekli ve üstün yetenekli olmayan öğrencilerin kendilerini gerçekleştirme düzeylerine ilişkin algılarının belirlenmesini ve karşılaştırılmasını amaçladığı için betimsel yöntemin kullanıldığı nicel bir çalışma olup, tarama modeline uygun olarak hazırlanmıştır. Araştırma evrenini, 2015-2016 eğitim-öğretim yılında, Sakarya ili merkezinde yer alan BİLSEM ve ilçesindeki ortaokuldan 12-16 yaş aralığında bulunan BİLSEM'de eğitim alan 107, BİLSEM'de eğitim almayan 137 öğrenciden oluşmaktadır. Veri toplama aracı olarak Battal ve Şan tarafından geliştirilen, Likert tipi "Kendini Gerçekleştirme Ölçeği" kullanılmıştır. "Kendini Gerçekleştirme Ölçeği"; duygu bütünlüğü, eleştireldüşünme, insan ilişkileri ve yaratıcılık olmak üzere 4 alt boyuttan ve 30 maddeden oluşmaktadır. Duygu Bütünlüğü (4,14,18,19,21,22,24,25,27,28,29), Eleştirel Düşünme (9,13,17,20,23,26), İnsan İlişkileri (1,2,3,5,6,7,10), Yaratıcılık (8,11,12,15,16,30) boyutlarının her biri değişik sayıda madde içermektedir. Ölçek 4'lü Likert tipinde hazırlanmıştır. Ölçeği oluşturan maddeler 1'den 4'e "Her zaman", "Çoğu zaman", "Ara sıra" ve "Hiçbir zaman" şeklinde derecelendirilmiştir. Ölçeğin geçerlik güvenilirlik çalışmasında Cronbach Alpha güvenilirlik değeri 0,818 olarak tespit edilirken, Boran ve Şan (2013), tarafından yapılan üstün yetenekli öğrencilerin "Kendini gerçekleştirme düzeyleri" çalışmasında Cronbach Alpha değeri 0,695 bulunmuş ve bu çalışma için ise ölçeğin Cronbach Alpha değeri 0.749 olarak hesaplanmıştır.

Çalışmada ölçeğin yanı sıra oluşturulan kişisel bilgi formunda cinsiyet, ailenin gelir durumu, aile tutumu ve ailenin eğitim durumu, okul öncesinde eğitim görüp görmediği gibi demografik özelliklere de yer verilmiştir. Bu özellikler açısından öğrencilerin kendini gerçekleştirme durumu incelenmiştir. Analiz aşamasında, verilerin normal dağılmaması sebebiyle non-parametrik testlerden Mann-Whitney U ve Kruskal Wallis H testi kullanılmıştır.

Araştırmanın Bulguları: Araştırma bulguları, üstün yetenekli öğrencilerin, üstün olmayan öğrencilere göre kendini gerçekleştirme düzeylerinin yüksek olduğunu ve üstün yetenekli olarak tespit edilen öğrencilerin üstün olmayan bireylere göre insan ilişkileri, yaratıcılık, eleştirel düşünme ve duygu bütünlüğü konusunda algı düzeylerinin daha yüksek olduğunu göstermiştir. Ayrıca bulgular, cinsiyet değişkenine göre erkek öğrencilerin, kendini gerçekleştirme düzeyi, yaratıcılık

düzeyi ve eleştirel düşünme düzeyi algılarının kız öğrencilere göre daha yüksek olduğunu ancak insan ilişkileri ve duygu bütünlüğü konusunda cinsiyete göre anlamlı bir farklılık olmadığını ortaya koymuştur. Çalışmada ele alınan okul öncesi eğitim alıp almama durumuna göre ise okul öncesi eğitimi alan öğrencilerin insan ilişkileri, yaratıcılık ve duygu bütünlüğü düzeyleri okul öncesi eğitim almayanlara göre daha yüksek bulunmuş ancak eleştirel düşünme konusunda okul öncesi eğitim alıp almama durumuna göre anlamlı bir farklılık bulunmamıştır. Çalışmada elde edilen bir diğer bulgu ise anne baba tutumlarının kendini gerçekleştirme düzeyine etki etmemesidir. Çalışmaya katılan öğrencilerin kendini gerçekleştirme algı düzeyleri ölçeğinden aldıkları puanlar kardeş sayısına göre anlamlı bir farklılık göstermektedir. Tek çocuk olduğunu ifade eden öğrencilerin kendini gerçekleştirme algı düzeyleri ortalamasının kardeşi olan öğrencilere göre daha yüksek olduğu görülmektedir. Bunun yanı sıra, anne ve babasının üniversite mezunu olduğunu ifade eden öğrencilerin kendini gerçekleştirme algı düzeyleri ortalamasının, eleştirel düşünme ortalamasının, yaratıcılık ortalamasının ve duygu bütünlüğü ortalamasının annesinin ilköğretim ve orta öğretim mezunu olduğunu ifade eden öğrencilere göre daha yüksek olduğu elde edilmiştir. Ayrıca çalışmada ortalama gelir düzeyini yüksek olarak ifade eden öğrencilerin kendini gerçekleştirme algı düzeyleri ile insane ilişkileri ortalamasının diğerlerine göre daha yüksek olduğu saptanmıştır.

Araştırmanın Sonuçları ve Öneriler: Araştırma sonucunda elde edilen bulgulara göre BİLSEM’de eğitim alan öğrencilerin BİLSEM’de eğitim almayan öğrencilere göre kendini gerçekleştirme, insan ilişkileri, eleştirel düşünme, yaratıcılık ve duygu bütünlüğü algı düzeylerinin anlamlı olarak daha fazla olduğu görülmektedir. Cinsiyete göre öğrencilerin kendini gerçekleştirme düzeylerinde ve alt faktörleri olan eleştirel düşünme ve yaratıcılık düzeylerinde erkeklerin daha çok öne çıktığı görülmektedir. Okul öncesi eğitim alan, tek çocuk olan, anne ve babasının eğitim durumu üniversite olan, ortalama gelir düzeyi yüksek olan öğrencilerin kendini gerçekleştirme düzey algılarının daha yüksek olduğu bulunmuştur. Sonuç olarak üstün yetenekli öğrencilerin, üstün olmayan öğrencilere göre kendini gerçekleştirme, insan ilişkileri, yaratıcılık, eleştirel düşünme ve duygu bütünlüğü konusunda algı düzeylerinin daha yüksek olduğuna ilişkin elde edilen bulgu çerçevesinde, özellikle BİLSEM’de eğitim - öğretim düzenleyen öğretmenlerin bu konuda bilgilendirilmesi sağlanarak, eğitim programları ile öğrencilerin yüksek olan algı düzeylerini eğitimin hedefleri doğrultusunda yaratıcı ve üretken çalışmalara yönlendirilmesi sağlanabilir. Ayrıca eğitimde fırsat eşitliğinin varlığını unutmadan BİLSEM’lere devam edemeyen öğrencilerinde kendini gerçekleştirme ile ilgili algılarını yükseltici çalışmalara gerek eğitim programları gerek örtük programlar yoluyla yer verilmelidir.

Anahtar Kelimeler: Üstün yetenekli, Kendini gerçekleştirme, Bilim ve Sanat Merkezi



Cross-group Equivalence of Interest and Motivation Items in PISA 2012 Turkey Sample

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ABSTRACT

Purpose: The aim of this study was to examine measurement invariance of the interest and motivation related items contained in the PISA 2012 student survey with regard to gender school type and statistical regions and to identify the items that show differential item functioning (DIF) across groups.

Research Methods: Multiple-group confirmatory factor analysis was conducted to examine measurement invariance. When the invariance with regard

to gender was being investigated, potential item biases were examined, as the criteria used in the model fit evaluation were not met. Mantel-Haenszel, poly-SIBTEST, and item response theory likelihood ratio (IRT-LR) techniques were employed to identify which items displayed DIF. **Findings:** Results of the invariance test conducted based on the school type and statistical regions demonstrated that the models satisfied all invariance conditions. Failure to achieve measurement invariance according to gender indicates that at least one of the items in the scale displayed DIF. When the results of DIF according to gender were examined, MH identified DIF in six items at A level, poly-SIBTEST identified DIF in one item at A level, two items at B level, and three items at C level, IRT-LR identified DIF in two items at C level. **Implications for Research and Practice:** Further studies could determine which techniques would be more suitable for which situations by conducting simulation studies along with real data, and explore the possible reasons why the items display DIF.

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Introduction

The Programme for International Student Assessment (PISA) emphasizes factors that can affect student performance in addition to the school success of the students. To this end, student surveys have been conducted and student profiles have been formed to interpret the reasons behind PISA results. Conducting the application at certain intervals enables countries to compensate for their deficiencies and to monitor to what degree they realized their basic goals regarding education (Ministry of National Education [MNE], 2010). PISA is one of the applications through which participant countries change their education systems based on the results obtained. The meaningfulness of these results depends on the equivalence of the measurement tool forms across different groups. Employment of the measurement tools in which the demographic properties of the individuals are not disregarded, and comparative interpretation of the results obtained via these measurement tools might yield inaccurate results (Reise, Widaman & Pugh, 1993). This lowers the validity of the measurement tool and causes both affective and cognitive characteristics of the students to be inaccurately determined (Atalay Kabasakal & Kelecioğlu, 2012).

Validity of group comparisons depends on whether the relevant measurements possess an acceptable level of psychometric characteristics (Önen, 2007). However, in the classical test theory (CTT), test and item statistics calculated within the scope of validity and reliability studies reflect the properties of the study group (Crocker & Algina, 1986; Linden & Hambleton, 1997). In cases that individuals upon whom the measurement tool was applied differ with regard to factors such as geography, language, ethnicity, race, gender, etc., the same characteristics may not be measured similarly (Prelow, Tein, Roosa & Wood, 2000). This limitation of CTT constitutes the basis for the measurement invariance (Vandenberg & Lance, 2000).

Measurement Invariance

Flowers, Raju and Oshima (2002) defined measurement invariance as “the state that the individuals who are the members of different groups but have the same scores regarding a specific latent structure earn the same observed scores at the levels of items and sub-scales.” According to this definition, measurement invariance can be expressed as the probability that an individual with a certain observed score does not depend on the group of the individual. Measurement invariance consists of steps, and at each step, an ever-increasing number of inter-group equality limitations are imposed with regard to the relevant parameters (Önen, 2009). The four steps proposed by Meredith (1993) and the hypothesis created for each step are as follows:

- 1) *Configural Invariance*: In this step, across-group equivalence limitation is imposed on the model, the theory of which was established (Wu, Li & Zumbo, 2007). Evidence of configural invariance means that the measurement tool represents the same psychological structure across groups (Vandenberg & Lance, 2000).
- 2) *Metric Invariance*: In addition to factor structure, factor loadings should also be equivalent in the sub-groups (Cheung & Rensvold, 2002). Ensuring metric invariance

shows similar/the same meaningfulness levels of the items for all groups (Johnson, 1998).

3) *Scalar Invariance*: In addition to factor structure and factor loadings, regression constants should also be equivalent across sub-groups in order to ensure scalar invariance (Cheung & Rensvold, 2002). It is necessary to achieve scalar invariance to compare the latent structure means across groups (Meredith, 1993).

4) *Strict Invariance*: In this step, it is hypothesized that error variances are equivalent across comparison groups.

In order for comparisons to be meaningful across groups, it is necessary to ensure measurement invariance (Van de Vijver & Tanzer, 2004). It would not be possible to figure out if the difference observed in the comparisons that are conducted without satisfying this requirement results from a real condition, or because the construct being measured differs across groups (Somer, Korkmaz, Dural & Can, 2009). Therefore, comparison results might be controversial.

Differential Item Functioning

A critical issue being discussed within the scope of measurement invariance across groups investigation is "bias" (Önen, 2009). Bias is defined as the systematic error against a group on the measurement results, and it affects the validity of the test scores (Angoff, 1993; Camilli, 2006). It is possible to investigate bias at item level via differential item functioning (DIF).

DIF, which is the first step of determining item bias, means the probability that responders with the same skill level in different groups answer the items in a test correctly differs (Holland & Wainer, 1993). DIF can also be described as the presence of the dimensions other than the construct aimed to be measured via the measurement tool (Roussos & Stout, 1996). The presence of DIF might misguide the researchers concerning the differences across groups and causes wrong decisions to be made about the individuals (Gök, Atalay Kabasakal & Kelecioğlu, 2014). In order to overcome this problem, studies on DIF are being carried out.

Based on the explanations provided so far, it is considered that the obtained data about the assessment of Turkey from the PISA application, in which member countries of the Organization for Economic Cooperation and Development (OECD) initially participated, has become one of the most significant research initiatives carried out worldwide today (MNE, 2010). As such, it is important to investigate measurement invariance and determining the items that show DIF across groups.

Purpose of Study

The aim of this study was to examine measurement invariance of the interest and motivation-related items contained in the PISA 2012 student survey with regard to gender, school types, and statistical regions, and to identify the items that show DIF across groups.

Method

Research Design

In this study, measurement invariance of eight items related to interest and motivation for mathematics involved in the PISA 2012 application was analyzed with regard to gender, school type, and statistical regions, and it was determined whether the items demonstrated DIF across genders. In terms of this, the study is descriptive and aims to determine an existing situation concerning psychometric characteristics of the measurements obtained from interest and motivation sub-scales.

Research Sample

Turkey participated in the PISA 2012 application with 4,848 students who represented approximately 1,266,638 students at the age of 15 (MNE, 2013). Following the investigation of the data set in terms of missing data and outliers, this study was carried out with 3,124 students (1,553 girls and 1,571 boys) in the Turkey sample. Table 1 presents the distribution of the students in the study group according to their school types and statistical regions.

Table 1

Distribution of the Students in Study Group According to School Types and Statistical Regions

	Primary School	General High School	Anatolian and Science High Schools	Technical and Vocational High Schools	Total
İstanbul Region	3	188	95	228	514
Western Marmara Region	2	10	21	83	116
Aegean Region	1	48	125	207	381
Eastern Marmara Region	1	57	62	196	316
Western Anatolia Region	1	99	66	168	334
Mediterranean Region	3	163	94	140	400
Central Anatolia Region	2	24	67	78	171
Western Black Sea Region	3	66	44	57	170
Eastern Black Sea Region	7	23	21	89	140
North Eastern Anatolia Region	6	23	44	40	113
Central Eastern Anatolia Region	11	81	21	41	154
South Eastern Anatolia Region	27	151	50	87	315
Total	67	933	710	1414	3124

Data Collection

In this study, data obtained from Turkey sample in the student survey, which was administered within the scope of PISA, organized by OECD in 2012, were used. The investigations were carried out through the answers provided to eight items related to interest and motivation in the student survey within the scope of the study. The data used in the study were obtained from the OECD PISA website (www.pisa.oecd.org).

Data Analysis

With a view to obtaining evidence regarding whether ST29Q01-ST29Q08 items contained in the PISA student survey mathematics teaching sub-dimension created the interest and motivation model, confirmatory factor analysis (CFA) was executed. The data set was examined prior to the analysis and the analysis run revealed that missing data rates regarding each variable varied between 0.78 and 1.25. These data were excluded from the analysis since the missing data rate was found to be less than 5% (Tabacknick & Fidell, 2007; Kline, 2011, p. 55).

Distribution characteristics of the relevant data set were examined in order to determine which parameter prediction method would be employed during the model testing process. To this end, z values regarding multivariate skewness (zs), kurtosis (zk), and χ^2 value (zs=24.80, zk=34.982 and $\chi^2=1842.793$, $p<.05$) regarding multivariate skewness and kurtosis were calculated. Since the data set was not normally distributed and the sample size was large, the weighted least squares (WLS) method was used in parameter prediction (Kline, 2011, p. 180).

Multiple-group confirmatory factor analysis (MG-CFA) was conducted in order to examine measurement invariance. The analysis started with testing the least limited model and continued by increasing the number of limitations. With the aim of comparing the fit levels of a more limited and less limited model with the research data, the scaled difference chi-square test was applied (Bentler; 2006; Brown, 2006). $\Delta S-B\chi^2$ calculated based on the difference between the degrees of freedom of two models was not found to be statistically significant, and this was interpreted as evidence that invariance was achieved at that level (Vanderberg & Lance, 2000; Byrne & Watkins, 2003; Mark & Wan, 2005).

When the invariance with regard to gender was being investigated, potential item biases were examined since the criteria used in the model fit evaluation were not met. Mantel-Haenszel, poly-SIBTEST, and item response theory likelihood ratio (IRT-LR) techniques were employed to identify which items displayed DIF. Mantel-Haenszel analysis was conducted via JMETRIK, Poly-SIBTEST was conducted via SIBTEST, and IRT-LR analysis was conducted via IRTLRDIF software. The statistics taken into consideration to identify the items that demonstrated DIF were p for MH, β_u for SIBTEST, and G2 for IRT-LR.

Results

Step I: Confirmatory Factor Analysis

In order to examine whether the factor structure of the basic model described regarding the factor structure of the 8-item Turkish form of the survey was valid within each group, the fit of the model was examined separately for the integrated data and for the data of each group. Table 2 summarizes the fit indexes calculated for each group at the end of the CFA analysis.

Table 2

Interest and Motivation Measurement Model Fit Index

GROUP	χ^2	df	RMSEA	GFI	AGFI	CFI	NNFI
Whole Group	199.05	19	0.055	0.98	0.96	0.99	0.99
Female	195.83	19	0.077	0.96	0.92	0.85	0.78
Male	75.64	19	0.044	0.98	0.96	0.95	0.93
Primary School	32.35	19	0.103	0.83	0.67	0.97	0.95
General High Schools	71.89	19	0.055	0.97	0.94	0.99	0.99
Anatolian and Science High Schools	97.92	19	0.077	0.96	0.92	0.99	0.98
Tech. and Vocational High Schools	87.72	19	0.049	0.98	0.96	0.99	0.99
İstanbul Region	41.38	19	0.048	0.97	0.94	0.95	0.93
Western Marmara Region	31.06	19	0.074	0.93	0.87	0.91	0.87
Aegean Region	26.98	19	0.033	0.97	0.95	0.98	0.96
Eastern Marmara Region	33.67	19	0.050	0.96	0.93	0.99	0.99
Western Anatolia Region	41.66	19	0.060	0.96	0.92	0.99	0.99
Mediterranean Region	30.80	19	0.039	0.97	0.95	0.97	0.95
Central Anatolia Region	31.31	19	0.062	0.95	0.91	0.93	0.90
Western Black Sea Region	31.57	19	0.063	0.92	0.85	0.99	0.99
Eastern Black Sea Region	30.28	19	0.065	0.93	0.86	0.99	0.98
North Eastern Anatolia Region	19.69	19	0.018	0.97	0.94	1.00	0.99
Central Eastern Anatolia Region	33.38	19	0.070	0.93	0.88	0.99	0.98
South Eastern Anatolia Region	40.33	19	0.060	0.96	0.91	0.99	0.99

*p<.05

When the fit statistics related to the relevant model are examined, it is seen that the criteria used in the model fit assessment are within the acceptable boundaries (GFI=0.98, AGFI=0.96, CFI=0.99, NNFI=0.99, and RMSEA=0.055). Factor loading values and unique variances were found to vary between 0.75 and 0.88 and between 0.23 and 0.44, respectively. When the fit criteria regarding the model in the sub-groups were examined, the values with regard to NNFI for the girls; RMSEA, GFI, and AGFI for the primary schools; and NNFI for the Western Marmara Region did not meet the criteria required for the model fit. Therefore, it was decided to exclude these three groups that did not achieve the model data fit from the analysis.

Step II: Multiple-Group Confirmatory Factor Analysis

A four-step method was followed in order to examine the measurement invariance of the defined method across different groups. The findings obtained from the analysis carried out during measurement invariance investigation process were interpreted in line with the research questions. The results of the measurement invariance analysis conducted on the school types are as follows:

Configural Invariance: In this step, whether the factor structures of groups are equivalent was tested within the same model. The analysis results revealed that the fit indexes were within acceptable boundaries (CFI=0.96, GFI=0.98, NNFI=0.95, RMSEA=0.037, and $S-B\chi^2 = 173.94$ (df=73)), and this indicated that configural invariance was ensured. This means that the groups that provided the answers had the same conceptual points of view.

Metric Invariance: The fit indexes obtained after imposing equivalent factor loadings limitation within the groups along with configural invariance steps limitation show that metric invariance model fits to the relevant data at a satisfactory level (CFI=0.96, GFI=0.98, NNFI=0.96, RMSEA=0.032, and $S-B\chi^2 = 173.96$ (df=85)). In order to provide evidence that metric invariance was ensured, the fit level of this model and the fit level of configural invariance model were compared via the scaled difference chi-square test. TS statistic calculated via the scaled difference test was found to be smaller than the Table χ^2 value ($\chi^2(12, .05)=21.03$) for df=12, and this indicates that metric invariance was achieved. This signifies that meaning of the items is similar to the students at different schools.

Scalar Invariance: In addition to the limitations established in the first two steps, regression constants were also limited. Fit indexes calculated in order to analyze scalar invariance are CFI=0.96, GFI=0.97, NNFI=0.96, RMSEA=0.032, and $S-B\chi^2=182.66$ (df=90). When the fit level of this model and scalar invariance model were compared, TS statistic (TS=9.022) was found to be smaller than the Table χ^2 value ($\chi^2(5, .05)=11.07$), and this indicates that predicted item scores were obtained irrespective of the group membership. In other words, the items did not display bias.

Strict Invariance: Error variances are limited together with all previous parameter limitations. As a result of the MG-CFA analysis conducted in order to test strict invariance, fit indexes were found to be CFI=0.96, GFI=0.97, NNFI=0.96, RMSEA=0.032, and $S-B\chi^2 = 182.66$ (df=91). The TS statistic TS=0 (df=1) calculated was

found to be smaller than Table χ^2 value ($\chi^2(1, .05)=3.841$), and this indicates that error variances do not differ depending on the school types.

Results of the measurement invariance analysis of the defined measurement model across statistical regions are as follows:

Configural Invariance: Results of MG-CFA analysis conducted to test configural invariance revealed that fit indexes calculated were within acceptable boundaries (CFI=0.92, GFI=0.94, NNFI=0.92, RMSEA=0.043, and S-B $\chi^2=469.62$ (df=313), and this indicates that configural invariance was ensured.

Metric Invariance: It can be inferred that after imposing equivalent factor loadings limitation within the groups, it was ensured that the model fits to the relevant data at a satisfactory level (CFI=0.95, GFI=0.94, NNFI=0.96, RMSEA=0.031, and S-B $\chi^2=469.63$ (df=373)). TS=0 and df=60 values were obtained following the scaled difference in the χ^2 test. TS statistic calculated was found to be smaller than the table χ^2 value (79.08), and this indicates that metric invariance was achieved.

Scalar Invariance: Fit indexes calculated in order to analyze scalar invariance are CFI=0.95, GFI=0.94, NNFI=0.96, RMSEA=0.030, and S-B $\chi^2 =470.58$ (df=378). When the fit level of the scalar invariance model and metric invariance model were compared, TS statistic was compared to the table χ^2 value ($\chi^2(5, .05)=11.071$) for df=5, and TS statistic (TS=0.587) was found to be smaller than the Table χ^2 value. This indicates that scalar invariance was ensured.

Strict Invariance: MG-CFA executed in order to analyze the invariance of error variances presented fit indexes as CFI=0.96, GFI=0.94, NNFI=0.96, RMSEA=0.030, and S-B $\chi^2 =470.58$ (df=379). The Ts=0 statistics calculated as a result of the scaled difference chi-square test for χ^2 was smaller than the Table χ^2 ($\chi^2(1, .05)=3.841$) value, which shows that invariance of error variances had ensured.

Step III. Determining the Items Demonstrating DIF According to Gender

Failure to achieve measurement invariance according to gender indicates that at least one of the items in the scale displayed DIF. It is seen that different techniques employed in determining DIF yields different items with DIF. For this reason, it is recommended that numerous methods be used in the DIF analysis (Hambleton, 2006). Accordingly, MH, poly-SIBTEST, and IRT-LR techniques were employed to determine if items showed invariance across genders, and results were compared. Regarding the items that displayed DIF across genders, the results of the MH technique, the poly-SIBTEST technique, and the IRT-LR technique are found in Tables 3, 4, and 5, respectively.

Table 3

MH Analysis Results of Interest and Motivation Items According to Gender Variable

Item	χ^2	<i>p</i>	Δ -MH	DMF Level
ST29Q01	17.43	0.00	-0.10	A
ST29Q02	29.12	0.00	0.10	A
ST29Q03	10.74	0.00	-0.06	A
ST29Q04	0.79	0.37	-0.02	
ST29Q05	16.27	0.00	0.08	A
ST29Q06	11.07	0.00	-0.06	A
ST29Q07	5.03	0.02	0.05	A
ST29Q08	0.99	0.77	0.01	

Reference group: males; Focus group: females

MH results indicate that a negligible level (A level) of DIF was presented in six items.

Table 4

Poly-SIBTEST Analysis Results of Interest and Motivation Items According to Gender Invariable

Item	β_u	Standard Error	<i>p</i>	DMF Level	Advantageous Group
ST29Q01	-0.108	0.025	0.000	C	K
ST29Q02	0.126	0.021	0.000	C	E
ST29Q03	-0.085	0.023	0.000	B	K
ST29Q04	-0.013	0.022	0.548		
ST29Q05	0.100	0.024	0.000	C	E
ST29Q06	-0.069	0.022	0.002	B	K
ST29Q07	0.054	0.023	0.018	A	E
ST29Q08	0.008	0.025	0.765		

Reference group: male students; Focus group: female students

Table 4 presents that the beta value is significant in six items out of eight. When these six items are examined, it is seen that one of them displayed DIF at A level, two of them at B level, and three at C level. The item that displayed DIF at A level favored boys, whereas the items that displayed DIF at B level favored girls. Of the

items that displayed DIF at C level, ST29Q01 showed DIF in favor of girls, and ST29Q02 and ST29Q05 showed DIF in favor of boys.

Table 5

IRT-LR Analysis Results of Interest- and Motivation-Related Items According to Gender Variable

Items	G2	parameter			DIF Level
		A	b	c	
ST29Q01	15.9		K		B
ST29Q02	0.0				
ST29Q03	15.7		E		B
ST29Q04	0.0				
ST29Q05	0.0				
ST29Q06	0.0				
ST29Q07	3.1				
ST29Q08	0.0				

Reference group: male students; Focus group: female students

When interest and motivation scale items were analyzed via the IRT-LR technique with respect to gender variable, B level of DIF was observed in two items. Item ST29Q01 showed DIF favored female students, while item ST29Q03 showed DIF favored male students.

The distribution of the items that displayed DIF in each of the three methods according to the levels at the end of the analysis run via MH, Poly-SIBTEST, and IRT-LR techniques are presented in Table 6.

Table 6

Distribution of the Items that Displayed DIF According to Gender

MH			Poly-SIBTEST			IRT-LR		
A	B	C	A	B	C	A	B	C
ST29Q01			ST29Q07	ST29Q03	ST29Q01			ST29Q01
ST29Q02				ST29Q06	ST29Q02			ST29Q03
ST29Q03					ST29Q05			
ST29Q05								
ST29Q06								
ST29Q07								

When Table 6 is examined, it is seen that MH identified DIF in six items, Poly-SIBTEST identified DIF in six items, and IRT-LR identified DIF in two items. In these methods, two items (ST29Q01 and ST29Q03) showed DIF. However, two items that displayed DIF at A level in the MH method displayed DIF at B level in the IRT-LR

method. Furthermore, according to the Poly-SIBTEST method, item ST29Q01 showed DIF at C level, and item ST29Q03 showed DIF at B level.

There are four items that did not display DIF via the IRT-LR method, but showed DIF via MH and Poly-SIBTEST methods. These are items ST29Q02, ST29Q05, ST29Q06, and ST29Q07, which display DIF according to the MH method at A level, and according to the Poly-SIBTEST method at A (ST29Q07), B (ST29Q06), and C (ST29Q02 and ST29Q05) levels.

As a result, it is clear that two items (ST29Q01 and ST29Q03) displayed DIF via all these three methods, however, their levels are different. The MH and Poly-SIBTEST methods showed fit in identifying DIF; however, their levels were found to be different. Different from the two methods, the IRT-LR method, however, shows that only 25% of the items displayed DIF.

Discussion and Conclusion

Findings of the study indicated that the model described with regard to the interest and motivation-related items contained in the PISA 2012 student survey Turkish form sufficiently fits all sub-group data, except for female students, primary schools, and Western Marmara groups. After the groups that did not fit the model were excluded from the analysis, equality of content was ensured among the sub-groups (Önen, 2009).

Results of the invariance test conducted based on the school type demonstrated that the model satisfied all the invariance conditions. This signifies that the measurements obtained from all interest and motivation-related items could be generalized among the school groups, and provide reliable and valid measurements in determining the interests and motivations of the students. Nevertheless, ensuring a complete measurement invariance among all groups is not always possible (Steenkamp & Baumgartner, 1998). Likewise, Uyar and Doğan (2014), found that the model they described for learning strategies met the configural and metric invariance conditions in the sub-groups.

The analysis indicated that comparison of the described model according to statistical regional was significant. Accordingly, it could be said that the difference observed in the comparisons in the regional groups resulted from the real situation. This finding is in parallel with the study by Uyar and Doğan (2014) that investigated the differences of the variable affecting learning strategies across regions. Similarly, Wu et al. (2007) specified that TIMSS 1999 mathematics tests ensured strict invariance in the same cultures. Numerous studies investigating the sub-group invariance of different models that were described regarding the international large-scaled exams showed that all invariance steps were not ensured (Wu et al., 2007; Akyıldız, 2009; Uzun & Öğretmen, 2010).

The spread of the large-scaled exams paved the way for different test forms to be administered to individuals at the same level, and for the same test forms to be

administered in groups with different characteristics (Atalay Kabasakal, 2014). Within this scope, a point that must be considered in administering national and international tests is the impact of the membership of different demographic groups on the measurement results. The national test applications performed at the national level indicate that the reasons for DIF include variables such as gender and school type (Bakan Kalaycıoğlu & Kelecioğlu, 2011; Gök, Kelecioğlu & Doğan, 2010). Le (2009) maintained that inclusion of items that displayed DIF in the internationally large-scaled exams such as PISA is inevitable. Similarly, the results of the present study also indicated that gender difference affected that the items displayed DIF. Similarly, the studies by Le (2009), Atalay Kabasakal and Kelecioğlu (2012), Akın Arıkan (2015), Başokçu and Öğretmen (2013) found that the items in the test applications displayed DIF across genders. When gender-related DIF is examined, it is seen that the characteristics of items such as format, scope, and cognitive complexity level are seen among the possible reasons for DIF (Bakan Kalaycıoğlu & Berberoglu, 2010; Zumbo & Gelin, 2005, Mendes-Barnett & Ercikan, 2006). Contrary to the results of this study, Başusta & Gelbal (2015), however, presented that the science and technology items in the PISA 2006 student survey could provide valid and reliable measurements across genders.

Although DIF identification techniques provide similar results at certain levels in a general sense, since they use different equalization criteria, algorithms and breakpoints in categorizations, they are not in a complete fit (Bakan Kalaycıoğlu & Berberoglu, 2010). In accordance with these findings, it was observed that similarities between the number of items displaying DIF and amount of DIF was low according to the techniques used. Similarly, studies by Gök, Kelecioğlu and Doğan (2010), Çıkrıkçı Demirtaşlı and Uluştas (2015) found a difference between the techniques in terms of the number of items that showed DIF. The analysis results showed that the number of the items with DIF was found to be high via MH and Poly-SIBTEST techniques. This may have resulted because these techniques are more sensitive compared to the IRT-LR technique. In addition, these techniques require smaller samples than the techniques based on the Item Response Theory, which could be seen as an advantage of these techniques (Penfield & Camilli, 2007). The studies have demonstrated that the reasons for the differences among the techniques include factors such as the various difficulties and discrimination of the items, different sample sizes, different group means, and skills (Hidalgo & Pina, 2004; Narayanan & Swaminathan, 1996; Fidalgo, Mellenbergh & Muñiz, 2000).

Within the scope of this study, interest and motivation-related items contained in the PISA 2012 application mathematics teaching section were examined. Further studies might examine the measurement invariance of the survey items administered within the scope of international studies such as PISA, PIRLS, and TIMSS for groups with differing cultures and religions. This study employed MH, poly-SIBTEST, and IRT-LR techniques in order to identify the items that displayed DIF. Future studies could determine which techniques would be more suitable for which situations by conducting simulation studies along with real data, and exploring the possible reasons why the items display DIF.

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PISA 2012 Türkiye Örnekleme İlgi ve Motivasyon Maddelerinin Gruplar Arası Karşılaştırmalarda Eşdeğerliğinin İncelenmesi

Atıf

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Özet

Problem Durumu: Grup karşılaştırmaların geçerliği, ilgili ölçümlerin kabul edilebilir düzeyde psikometrik niteliklere sahip olmasına bağlıdır. Ancak klasik test kuramında, geçerlik ve güvenilirlik çalışmaları kapsamında hesaplanan test ve madde istatistikleri, araştırma grubunun özelliklerini yansıtmaktadır. Büyük ölçekli sınavların kullanımının yaygınlaşması ise aynı düzeydeki bireylere farklı test formlarının uygulanmasına ve aynı test formlarının farklı özelliklere sahip gruplarda uygulanmasına yol açmıştır. Bu bağlamda ulusal ve uluslararası test uygulamalarında dikkat edilmesi gereken bir durum, farklı demografik gruplara ait olmanın ölçme sonuçları üzerindeki etkisidir. Bireylerin demografik özelliklerinin etkisinin arındırılmadığı ölçme araçlarının kullanılması ve bunlardan elde edilen sonuçların karşılaştırılmalı olarak yorumlanması ise ölçme aracının geçerliğini düşürerek, bireyler hakkında yanlış kararlar alınmasına neden olacaktır. Bu nedenle ölçme sonuçlarına dayalı olarak verilecek kararların isabetliliği açısından ölçme değişmezliğinin sağlanması ve maddelerin olası yanlılık şüphesine karşı sınanması gerekmektedir. Bu koşullar sağlanmadan yapılan karşılaştırmalarda görülen farklılığın gerçek durumdan mı yoksa ölçülen yapının gruplarda farklılık göstermesinden mi kaynaklandığı bilinemeyecektir. Dolayısıyla yapılan karşılaştırma sonuçları tartışılmalı olabilecektir.

Araştırmanın Amacı: Bu çalışmanın amacı; PISA 2012 öğrenci anketinde yer alan ilgi ve motivasyonla ilgili maddelerin cinsiyet, okul türü ve istatistikî bölgelere göre ölçme değişmezliğini incelemek ve gruplar arası DMF gösteren maddeleri tespit etmektir.

Araştırmanın Yöntemi: PISA 2012 uygulamasında Türkiye, 15 yaş grubu yaklaşık sayısı 1.266.638 öğrenciyi temsilen 4848 öğrenci ile yer almıştır. Veri setinin kayıp ve aykırı değerler açısından incelenmesi sonrasında bu araştırma, Türkiye örneklemindeki 3124 öğrenci (1553 kız ve 1571 erkek) ile yürütülmüştür. PISA öğrenci anketi matematik öğretimi alt boyutunda yer alan ST29Q01-ST29Q08 maddelerinin ilgi ve motivasyon modelini oluşturup oluşturmadığına ilişkin kanıtlar elde etmek üzere, doğrulayıcı faktör analizi uygulanmıştır. Ölçeğin 8 maddelik Türkçe formunun faktör yapısına ilişkin tanımlanan temel modelin faktör yapısının her bir grup içinde geçerli olup olmadığını incelemek için model uyumu birleştirilmiş veri ve her bir grup verisi için ayrı ayrı değerlendirilmiştir. Model test etme sürecinde, hangi parametre kestirim yönteminin kullanılacağını belirlemek için ilgili veri setinin dağılım özellikleri incelenmiştir. Veri seti çok değişkenli normal dağılım sergilemediği ve örneklem sayısı büyük olduğu için parametre kestiriminde

ağırlıklandırılmış en küçük kareler yöntemi kullanılmıştır. Ölçme değişmezliğini incelemek üzere çoklu grup doğrulayıcı faktör analizi uygulanmıştır. Değişmezlik testleri dört aşamada yürütülmüştür. Daha fazla sınırlama konulan bir model ile daha az sınırlama konulan bir modelin araştırma verisine uyum düzeylerini karşılaştırmak üzere χ^2 'ler için ölçeklendirilmiş fark testi uygulanmıştır. Cinsiyete göre ölçme değişmezliğinin incelenmesi sürecinde, model uyumunun değerlendirilmesinde kullanılan ölçütler karşılanmadığı için olası madde yanlılıkları incelenmiştir. DMF gösteren maddelerin belirlenmesi amacıyla Mantel-Haenszel, poly-SIBTEST ve MTK-OO teknikleri kullanılmıştır.

Araştırmanın Bulguları: Ölçeğin 8 maddelik Türkçe formunun faktör yapısına ilişkin tanımlanan temel modelin kız öğrenci, ilköğretim ve Batı Marmara grupları dışındaki tüm alt grup verilerine yeterli düzeyde uyum sergilediğini göstermiştir. Modele uyumunu sağlamayan gruplar, analiz dışında bırakılmıştır. Okul türü ve istatistiki bölgelere dayalı olarak yapılan değişmezlik testi sonuçları, modellerin tüm değişmezlik koşullarını yerine getirdiğini göstermiştir. Cinsiyete göre ölçme değişmezliğinin sağlanmaması, ölçekte yer alan maddelerden en az bir tanesinin cinsiyete göre DMF sergilediğine işaret etmektedir. Bu bağlamda, cinsiyete göre DMF sonuçları incelendiğinde MH tekniğine göre 6 maddede A düzeyinde; poly-SIBTEST tekniğine göre 1 maddede A, 2 maddede B ve 3 maddede C düzeyinde; MTK-OO tekniğine göre 2 maddede C düzeyinde DMF'ye rastlanmıştır.

Araştırmanın Sonuç ve Önerileri: Yapılan analizler tanımlanan modelin, okul türü ve istatistiki bölgelere göre karşılaştırılmasının anlamlı olduğunu ortaya koymuştur. Bu durum, ilgi ve motivasyonla ilgili tüm maddelerden elde edilen ölçümlerin okul grupları ve istatistiki bölgeler arasında genellenebileceğine, öğrencilerin ilgi ve motivasyonlarını belirlemede geçerli ve güvenilir ölçümler sağlayabileceğine işaret etmektedir. Bu doğrultuda okul ve bölge grupları arasında yapılan karşılaştırmalarda görülen farklılığın gerçek durumdan kaynaklandığı söylenebilir. Yapılan ulusal düzeydeki test uygulamaları, DMF'nin nedenleri arasında cinsiyet ve okul türü gibi değişkenleri göstermektedir. Nitekim bu çalışmanın sonuçları da cinsiyet farklılıklarının maddelerin DMF göstermesinde etkili olduğunu göstermiştir. DMF belirleme teknikleri genel olarak belli ölçüde benzer sonuçlar verse de, farklı eşitleme kriterleri ile farklı algoritmalar ve kategorilendirmelerde farklı kesme noktaları kullandıkları için tam bir uyum içinde değildir. Çalışmadan elde edilen sonuçlar incelendiğinde, kullanılan tekniklere göre DMF gösteren madde sayıları ve DMF miktarları arasındaki benzerliğin düşük düzeyde olduğunu gözlenmiştir. Bu çalışma kapsamında PISA 2012 uygulaması matematik öğretimi bölümünde yer alan ilgi ve motivasyonla ilgili maddeler incelenmiştir. Gelecek çalışmalar, farklı dil ve kültür grupları üzerinde ölçme değişmezliği çalışmaları yapabilir. DMF belirlemede gerçek veri ile birlikte simülasyon çalışmaları yaparak, hangi tekniğin hangi durumlar için daha uygun olduğunu belirleyebilir ve DMF gösteren maddelerin olası nedenlerini araştırabilir.

Anahtar Kelimeler: PISA, ölçme değişmezliği, çoklu grup doğrulayıcı faktör analizi, değişen madde fonksiyonu.



Effects of the Sense-Based Science Education Program on Scientific Process Skills of Children Aged 60–66 Months

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ABSTRACT

Purpose: This study aimed to examine the effects of the Sense-Based Science Education Program on 60–66 months old children's scientific process skills. **Research Methods:** In this study, which carries experimental attribute features, the pre-test/final-test/observing-test control grouped experimental pattern, and qualitative research were used. Forty children who are 60–66 months old that attended independent preschool and nursery school classes in 2013–2014 education year took part in this study. Data in the study was collected with Personal Information Forms and Scientific Process Skills Evaluation Scale for 48–66 Months Old Children (SPSES).

Findings: The findings obtained from the research show that the SPSES final-test score averages of the experimental and control groups have a significant level of difference ($p < 0.05$) favoring the experimental group. When the experimental group's SPSES pre-test/final-test score averages were compared, a significant level of difference ($p < 0.05$) favoring the final-test was seen. When the control group's SPSES pre-test/final-test scores were compared, again a significant level of difference ($p < 0.05$) was found. Also, when the experimental and control groups' SPSES final-test score averages were compared, a significant difference ($p < 0.05$) favoring the experimental group was determined. Though no significant difference was found when the experimental group's observation test and final-test score averages were compared, when the observation test and pre-test score averages were compared a highly significant level ($p < 0.05$) was found. **Implications for Research and Practice:** When the research results were evaluated, it was concluded that the Sense-Based Science Education Program has a positive effect on children's scientific process skills. Future studies could examine children's scientific process skills in multifaceted and diverse disciplines.

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Introduction

The most important need of a learning process is to enhance the most basic cognitive process, such as attention and perception, by supporting children's learning desires at an early period with cognitive activities that engage their attention (Shams & Seitz, 2008). Perception process is the most important element because it enables knowledge to be transferred to the memory and increases its permanence (Ayvaci & Yurt, 2016). The development of perception is possible by active and balanced stimulation of all senses (Stockdale, 2007; Robinson, 2008). When early childhood studies on perception learning are examined, it is seen that single-acting sensory learning model was focused on. (Tomchek & Dunn, 2007). However, children in the early period need to research and receive feedback from their surroundings through sensory experiences by using all their senses and performing practical experiences (Goodwin, 2008; Trundle & Sackes, 2015). Sensory inputs received from their surroundings have an important role in their brain development (Todd, 2010). Consequently, newly acquired information and skills in multiple sense studies causes constant functional changes in the brain, and various synaptic links are established in the brain (Thomchek & Dunn, 2007). For this reason, using neuroscientific studies in education makes it easier to understand the brain's potential, operation, and effects of coarse sensory experiences on the development of cognitive process (Bruer, 1997; Arnold, Bourdeau & Nott, 2016; Duran & Unal, 2016). In this context, science education offers a variety of opportunities for children to work towards their interests and sensitivities and to observe and discover by using sensory materials, all of which ensure effective usage of their scientific process skills (Sackes, Trundle, Bell & O'Connell, 2011; Trundle & Sackes, 2015). Because in early childhood, children's questions arising from their curiosity and interest are related to scientific content (Inan, 2007). For this reason, what makes science an effective method is that it is a method that holds all the components, such as senses, brain development, and scientific process skills, together (Kandir et al, 2012).

Insufficiencies and problems were observed in the preparation and application of a science education program, which uses methods and techniques focusing on children's sense development and targeting scientific process skills development in the early childhood period. As a result of this, problems arising in the preparation and application of a conscious and balanced sense-supported science education program have increased the need of studies in this area. For this reason, it is extremely important that the sense-based science education program, which is actively encourages learning through the use of all five senses in the early childhood period, is planned. As a result, the perception awareness is increased and scientific activities that accelerate and support children's scientific thinking skills are included in the program.

This research was conducted to test the effects of the "Sense-Based Science Education Program" on children's scientific process skills which is based on science education targeting 60-66 months old children and was developed with the intent to help raise individuals who can think scientifically, make effective discoveries using all senses, conducts research, questions, and has problem-solving skills.

Method

Research Design

In this experimental attribute featured study, the following methods were used: pre-test/final-test/observation-test, control grouped experimental pattern, qualitative research interview, observation, and image analysis.

Research Sample

The universe of the research is composed of 60-66-month-old children enrolled in independent preschool and nursery classes connected to the National Ministry of Education during the 2013-2014 school year in the Malazgirt district of Mus province. The working group of the study is composed of 40 children who were randomly selected among 60-66-month-old children attending preschool and nursery classes. Twenty of the children who composed the working group were determined as the experimental group, whereas the other 20 were determined as the control group.

Research Instrument and Procedure

Personal Information Form. Information regarding the children was collected through a "Personal Information Form." When the personal data of the children were examined, it was determined that the children's age group breaks down as follows: 58.5% are between 60-66 months, 24.3% between 56-60 months, and 19.0% between 48-56 months old. It was further found that 53.7% of them are girls and 46.3% of them are boys, and that 58.5% of them have attended preschool education for one year, 19.5% have never attended a preschool, 14.7% of them have attended for two years, and 7.3% of them have attended for three years.

Scientific Process Skills Evaluation Scale (SPSES) for 48-66-Month-Old Children. The data studied was collected using SPSES, which was developed by researchers Tekerci and Kandir (2013). SPSES already had a validity and reliability study performed on it and consists of eight sub dimension and 79 items.

Teacher Observation Form and Teacher Interview Form. In order to evaluate the program's effectiveness, a "Teacher Observation Form" and "Teacher Interview Form" were used.

Development and Implementation of Sense-Based Science Education Program. The program that was prepared for 60-66-month-old children and aims to support their scientific process skills in the preschool period. The program activates all senses of children and is a type of science education program that includes basic science areas related to learning experiences and activities aimed at children's observation, comparison, classification, measurement, recording, communication, elicitation, and guessing skills. The program also has the features of activating children's curiosity and interest in science and supporting the problem-solving, reasoning, decision-making, and scientific thinking skills of children.

While the content planning of the program was being carried out, the basic science fields of physical science, life sciences, and earth and space sciences were taken into consideration by an examination of the related literature. Furthermore, the themes were determined to be used as a tool in the activities based on the basic science branches of biology, zoology, botany, mathematics, physics, chemistry, geology, meteorology, astronomy, oceanology, and glaciology. In the activities, scientific process skills are listed in order and scaffolded.

While the program was being prepared, many methods and techniques, such as experimentation, project studies, mind maps, and observation trips, were made use of to develop children's scientific tendencies and cognitive skills. It was elaborated that the prepared materials would support children's senses, activate scientific process skills, and were multi-purposed and durable. While creating the program, sample science education programs implemented abroad were examined and principles of the program were determined.

In the Sense-Based Science Education Program, 32 activities and one alternative activity for each week were prepared to be implemented for minimum of 20 minutes a day, three times a week for eight weeks. Image and audio of teacher implementations were recorded throughout the activity by a researcher and an observer teacher from the field. After each implementation, it was evaluated by the researcher and observer teacher using the "Teacher Observation Form" through an examination of the recorded image and audio record. SPSES was applied to children who are in the experimental and control group as pre-test/final test. In order to determine the permanence of the effects of the program, it was applied to children in the experimental group four weeks after the SPSES final-test.

Data Analysis

During the research, the SPSS 20 packet program was used to analyze the data collected through the SPSES and "Personal Information Form". The data were analyzed using Independent Samples t-Test to compare the pre-test scores obtained by the study group SPSES, ANCOVA to compare the final-test scores obtained by the dimensions that have significant differences between the pre-test results of the control and experimental groups, and ANOVA to compare the pre-test/final-test/observation-test results. As 0.05 was used as the significance level, it was specified to have a significant difference when it is $p < 0.05$ and not to have a significant difference when it is $p > 0.05$.

Results

The findings obtained by the study were examined in two parts.

In the following are the findings on the evaluation of the implementation process of the Sense-Based Science Education Program. Evaluation of the implementation process of the program was done by "Teacher Observation Form." According to the results, the teacher had no problem implementing almost all of the activities. The

teachers' remarks on the program elements that they had applied were evaluated by the "Teacher Interview Form." Accordingly, teachers expressed that the program contributed to their professional and personal development and supported them in many ways to activate the children's scientific process skills with science education and address their multi-sensory learning process.

Findings regarding the effects of the Sense-Based Science Education Program on children's scientific process skills. Findings obtained from the research are presented in Tables 1-5.

Table 1

SPSES Sub-Dimensions Pre-Test Scores T-Test Results for the Experimental and Control Group

SPSES Sub-Dimensions	Group	n	M	SD	df	t	p	Et Square
Observation	Control	20	6.300	1.625	38	.213	.833	-
	Experiment	20	6.150	2.700				
Comparison	Control	20	3.450	1.605	38	-2.133	.039*	.097
	Experiment	20	4.950	2.704				
Classification	Control	20	4.900	1.252	38	-2.421	.020*	.134
	Experiment	20	6.700	3.080				
Measurement	Control	20	1.600	.598	38	-9.453	.000*	.701
	Experiment	20	2.950	.224				
Recording	Control	20	2.150	.813	38	-3.305	.002*	.223
	Experiment	20	.900	1.483				
Communication	Control	20	4.150	1.348	38	1.240	.223	-
	Experiment	20	4.700	1.455				
Inference	Control	20	2.000	.858	38	-9.831	.000*	.716
	Experiment	20	.050	.224				
Guessing	Control	20	3.550	1.234	38	-8.660	.000*	.663
	Experiment	20	1.000	.459				

It is seen in Table 1 that there is no significant difference ($p>0.5$) between the pre-test score averages of the observation sub-dimension and the communication sub-dimension of children in the work group, and there is a significant difference ($p<0.5$) between the pre-test averages of comparison, classification, measurement, recording, inference, and guessing. For this reason, in order to remove the effects of the pre-test scores on final-test scores, covariates were taken as a variable on all sub-dimensions. Pre-test/final-test score t-test results of the experimental group are presented in Table 2.

Table 2*SPSES Sub-Dimensions Pre-Test/Final-Test Scores t-Test Results of Experimental Group*

SPSES Sub-Dimensions	Measurement	n	M	SD	df	t	p	Et Square
Observation	Pre-Test	20	6.150	2.700	19	-12.104	.000*	0.885
	Final-Test	20	11.900	3.042				
Comparison	Pre-Test	20	4.950	2.704	19	-6.354	.000*	0.679
	Final-Test	20	8.350	2.033				
Classification	Pre-Test	20	6.700	3.080	19	-9.087	.000*	0.812
	Final-Test	20	12.950	0.999				
Measurement	Pre-Test	20	2.950	2.236	19	-41.000	.000*	0.988
	Final-Test	20	5.000	0.000				
Recording	Pre-Test	20	0.900	1.483	19	-11.650	.000*	0.877
	Final-Test	20	5.900	2.149				
Communication	Pre-Test	20	4.700	1.454	19	-18.242	.000*	0.946
	Final-Test	20	8.300	1.301				
Inference	Pre-Test	20	0.050	0.224	19	-17.971	.000*	0.944
	Final-Test	20	6.500	1.638				
Guessing	Pre-Test	20	1.000	0.459	19	-10.823	.000*	0.860
	Final-Test	20	7.450	2.856				

In Table 2, it is seen that there is a significant difference between the pre-test/final test score averages of the experimental group regarding the observation sub-dimension [$t(19) = -12.104, p < .02$], comparison sub-dimension [$t(19) = -6.354, p < .01$], classification sub-dimension [$t(19) = -9.087, p < .01$], measurement sub-dimension [$t(19) = -41.00, p < .01$], recording sub-dimension [$t(19) = -11.650, p < .01$], communication sub-dimension [$t(19) = -18.242, p < .01$], inference sub-dimension [$t(19) = 17.971, p < .01$], and guessing sub-dimension [$t(19) = -10.823, p < .01$]. Pre-test/final test score t-test results of the control group are presented in Table 3.

Table 3*SPSES Sub-Dimensions Pre-Test/Final Test Scores t-Test Results of Control Group*

SPSES Sub-Dimensions	Measurement	n	M	SS	Sd	t	p	Et Square
Observation	Pre-Test	20	6.100	1.552	19	-8.258	.000*	0.953
	Final-Test	20	10.050	1.317				
Comparison	Pre-Test	20	3.450	1.605	19	-7.178	.000*	0.648
	Final-Test	20	7.000	1.414				
Classification	Pre-Test	20	4.900	1.252	19	-5.480	.000*	0.612
	Final-Test	20	2.972	2.972				
Measurement	Pre-Test	20	1.600	0.598	19	-7.033	.000*	0.846
	Final-Test	20	3.300	0.865				
Recording	Pre-Test	20	2.150	0.813	19	-	.000*	0.883
	Final-Test	20	4.800	1.056				

Table 3 Continued

SPSES Sub-Dimensions	Measurement	<i>n</i>	<i>M</i>	<i>SD</i>	<i>df</i>	<i>t</i>	<i>p</i>	<i>Et Square</i>
Communication	Pre-Test	20	4.150	1.345	19	-7.025	.000*	0.722
	Final-Test	20	7.000	1.487				
Inference	Pre-Test	20	2.000	0.858	19	-4,937	.000*	0.562
	Final-Test	20	3.750	1.209				
Guessing	Pre-Test	20	3.550	1.234	19	-8.345	.000*	0.786
	Final-Test	20	7.000	1.487				

It is seen in Table 3 that the averages of the SPSES sub-dimension pre-test/final-test scores are as follows: observation sub-dimension [t(19)= - 8.258], comparison sub-dimension [t(19)= -7.178], classification sub-dimension [t(19)=-5.480], measurement sub-dimension [t(19)= - 7.033], recording sub-dimension [t(19)= -11.994], communication sub-dimension [t(19)= - 7.025], inference sub-dimension [t(19) = - 4.937], and guessing sub-dimension [t(19) = -8.345] (p<.05). The ANCOVA results regarding final-test scores of the experimental and control group are presented in Table 4.

Table 4

ANCOVA Results Regarding SPSES Sub-Dimensions Final-Test Scores of Experimental and Control Group

Source of Variance	Sum of Squares	<i>df</i>	Average of Squares	<i>f</i>	<i>p</i>	η^2
Pre-Measurement (Observation) Group (Experiment/Control)	65.277	1	65.277	16.834	.000	.313
Error	37.522	1	37.522	9.676	.004	.207
Pre-Measurement (Comparison) Group (Experiment/Control)	143.473	37	3.878			
Error	14.033	1	14.033	5.065	.030	.120
Pre-Measurement (Classification) Group (Experiment/Control)	7.892	1	7.892	2.848	.100	.071
Error	102.517	37	2.771			
Pre-Measurement (Measurement) Group (Experiment/Control)	.046	1	.046	.009	.925	.000
Error	130.191	1	130.191	25.801	.000*	.411
Pre-Measurement (Communication) Group (Experiment/Control)	186.704	37	5.046			
Error	.046	1	.046	.121	.729	.003
Pre-Measurement (Inference) Group (Experiment/Control)	9.716	1	9.716	25.398	.000*	.407
Error	14.154	37	.383			
Pre-Measurement (Guessing) Group (Experiment/Control)	17.146	1	17.146	11.119	.002*	.231
Error	10.327	1	10.327	6.697	.014*	.153
Pre-Measurement (Measurement) Group (Experiment/Control)	57.054	37	1.542			
Error	.151	1	.151	.071	.792	.002
Pre-Measurement (Classification) Group (Experiment/Control)	18.413	1	18.413	8.668	.006*	.190
Error	78.599	37	2.124			
Pre-Measurement (Communication) Group (Experiment/Control)	16,055	1	16.055	3.079	.088	.077
Error	35,086	1	35.086	6.730	.014*	.154
Pre-Measurement (Inference) Group (Experiment/Control)	192,895	37	5.213			
Error						

Table 4 shows that there is a statistically significant difference between the working group final-test observation sub-dimension score averages ($f= 16.834$; $p<.05$). The calculated effect size is ($\eta^2= .207$). It is seen that there is no significant difference between the final-test comparison sub-dimension score averages ($f= 2.848$; $p>.05$). The calculated effect size is ($\eta^2= .0,71$).

It is observed that there is an important difference between the final-test classification sub-dimension score averages. The acquired et square values are ($\eta^2=.411$). Significant difference exists between the final-test measurement sub-dimension score averages ($f= 8.668$; $p<.05$). The calculated effect size is ($\eta^2= .407$). A difference between the recording sub-dimension final-test score averages ($f=13.261$; $p<.01$) is seen. The calculated effect size is ($\eta^2= .264$).

An important difference between the communication sub-dimension final-test score averages ($f= 6.697$; $p<.05$) is seen. The calculated effect size is ($\eta^2=.153$). It is seen that there is an important difference between the inference sub-dimension score averages ($f= 8.668$; $p<.05$). The calculated effect size is ($\eta^2=.190$). An important statistical difference between the guessing sub-dimension final-test score averages ($f= 6.730$; $p<.05$) is seen. The calculated effect size is ($\eta^2=.154$). The pre-test/final test/observation-test score t-test results of the control group are presented in Table 5.

Table 5

T-Test Results Regarding SPSES Pre-Test/Final-Test/Observation-Test Scores of Experimental Group

SPSES		<i>n</i>	<i>M</i>	<i>SD</i>
<i>Sub-Dimensions</i>	<i>Measurement</i>			
Observation	Pre-Test	20	6.150	2.700
	Final-Test	20	11.900	3.042
	Permanence	20	12.000	2.596
Comparison	Pre-Test	20	4.950	2.704
	Final-Test	20	8.350	2.033
	Permanence	20	8.350	2.033
Classification	Pre-Test	20	6.700	3.080
	Final-Test	20	12.950	.999
	Permanence	20	12.950	.999
Measurement	Pre-Test	20	2.950	.224
	Final-Test	20	5.000	.000
	Permanence	20	5.000	.000
Recording	Pre-Test	20	.900	1.483
	Final-Test	20	5.900	2.150
	Permanence	20	5.850	2.277
Communication	Pre-Test	20	4.700	1.455
	Final-Test	20	8.300	1.302
	Permanence	20	8.300	1.302
Inference	Pre-Test	20	.050	.224
	Final-Test	20	6.500	1.638
	Permanence	20	6.800	1.105
Guessing	Pre-Test	20	1.000	.459
	Final-Test	20	7.450	2.856
	Permanence	20	7.500	2.800

When Table 5 is examined, no significant difference could be found between the final-test and observation test scores of any of the experimental group's sub-dimensions ($p>0.05$).

Discussion and Conclusions

In this study, it was determined that there is a significant difference between the SPSES sub-dimension pre-test/final-test score averages of children and that final-test scores increase compared to pre-test scores. Correspondingly, it can be said that multi-perception discoveries that occur via sense-based studies in science education increase learning and remembering. In their research, Brown et al. (2013), Schijndel (2014), and Omar, Puteh and Ikhsan (2014) mentioned that the science education programs that they implemented with different methods and techniques have an important effect on both the teacher's and the children's science performance and scientific process skills. In this respect, it can be said in order to develop scientific process skills during early childhood, science education program models and materials that use planned, programmed, and various methods and techniques that bring scientific thinking and questioning to the forefront and that provide education that supports scientific process skills have similar effectiveness. As a result of the acquired data, including scientific process skills in the learning process within the program progressively, we can conclude that using all senses actively and in balance may have a positive effect on children's scientific process skills.

During the study, when the SPSES sub-dimensions' pre-test/final test score averages of the children in the control group were compared, it was determined that the final-test scores had increased from the pre-test scores. According to the acquired results, the learning experiences that the teachers presented to the children, in accordance with acquisition and indicators that exist in MoNE's (MEB) program, had an effect on the children's scientific process skills. In this study, it was determined that the experimental group had higher SPSES observation sub-dimension scores than the control group. Observation skill forms the basis of all process skills that comes after itself due to being the base of scientific process skills and because these skills are structured progressively. As a result of an observation-based science project that they applied and observation materials that they used, Morrison (2012) and Gelman et al. (2010) indicated that systematic studies performed on observation skills increases children's noticing of details and awareness of the features to be observed. Thus, what made a significant difference in favour of the experimental group may be because of the fact that observation skills were supported as part of the "Sense-Based Science Education Program" with coarse-sense materials, and that studies aimed at children's recognizing and identifying substances and defining their features using their observation skills are included

In this research, no significant difference could be seen in regards to the acquired scores from the SPSES comparison sub-dimension. However, when the corrected averages were looked at, it was determined that the experimental group comparison

sub-dimension score average is higher than the control group average. The comparison process skill is defined as finding similarities/differences inside the objects or concepts (Ocak & Tümer, 2014). Using this skill, children start matching, comparing, determining similarities and differences as a result of their natural observations (Kandır et al, 2012). Correspondingly, having involved activities that support children's comparison skills and activate various senses at the same time in the program that was applied to experimental group may have increased the comparison sub-dimension scores.

It was determined that there was a significant difference in terms of scores acquired from the SPSES classification sub-dimension. Children who can distinguish between similarities and differences during the preschool period can also do binary classification according to indicated features. In their studies, Yampinij, Princhankol, and Sudsanong (2010) found out that with science program and computer games, children in the early period significantly develop their observation and classification skills. In this respect, since each child has a different pace of actualizing their scientific process skills, providing the activities that support classification skill with the coarse-sense method in combination with various science sub-fields in the applied education program may have positively affected the children's classification skill final-test scores.

In this study, it was determined that children in the experimental group had higher scores from the SPSES measurement and recording sub-dimensions. Progression studies and cognitive theories argue that response programs and stimuli that are applied have an effect on maximizing children's developmental potentials (Sackes, 2011). Correspondingly, science and mathematics education programs developed for early childhood aim to support children's developing mathematics skills with science activities (Klein et al, 2008; Clements et al, 2011).

The recording skill refers to children's expression of the data gathered from the measurements within science and math activities using pictures, music, visual works, graphics, photos, and verbal and numerical symbols (Kandır et al, 2012; Trundle & Sackes, 2015). The activities within the Sensory-Based Science Education Program concerning the skill of recording data, such as drawing tables, taking notes, drawing a sketch, tape recording, taking photos, and reporting a conducted experiment, can account for how the children's scores regarding measuring and recording skills are higher in experimental group.

Language develops within all mental processes and supports a child's mental development (Yazici & Ilter, 2008). Communication skill is an important one that children use to explain what they acquire through these processes and their expanding knowledge of words and concepts (Zaporozhets, 2002). Applied science education programs support children's progress in science skills and their use of concepts and knowledge of content. In a study examining children's verbal communication skills, development of scientific concept, and problem solving skills, Hong and Diamond (2012) asserted that there was a positive increase in these skills of children. Reviewing the relevant literature and surveys, it has been seen that there

is a positive relationship between children's development of language skills, vocabulary, knowledge of concepts, and in this respect their communicational skills and science activities.

The inference skill is defined as children's forming an opinion about the phenomena and events that they are unable to observe, based on their first observations and existing knowledge (Hanuscin & Rogers, 2008; Anagun & Yasar, 2009). That is why in science education children are allowed to make inferences using a logical reasoning process to understand the phenomena and events that they are unable to directly observe. (Morrison, 2012). When research results are analyzed, making children actively involved in trial and error with the "Sensory-Based Science Education Program" enables them to collect data using their senses and to create situations that require inference skills through engagement with unobservable themes such as gravity, balance, and slope. These may have had an influence on the inference skills of the children in the experimental group.

The SPSES predicting sub-dimension scores of children in the experimental group are specified as significantly high in the study. Prediction (making estimation in advance) involves making statements about future events or expected conditions (Hanuscin & Rogers, 2008). It requires one to make much more than a simple assumption (Mutisya, Rotich & Rotich, 2013; Ocak & Tumer, 2014). On one hand, the prediction skills of preschool children are limited because of their egocentric thinking (Kandir et al, 2012). On the other hand, when developmental differences are taken into consideration and preschool children are provided with appropriate guidance on how to reach the information, they are able to acquire prediction skills through trial and error. It is seen that the data obtained from the inference sub-dimension in the research and the study results presented above support each other.

No significant difference has been found in any of the sub-dimensions between post-test and monitoring test points in the SPSES of the children in the experimental group. The lack of significant difference indicates that the experimental processes carried out are permanent.

Conclusion

When the findings are analyzed, it is indicated that children's scientific process skills develop in parallel with cognitive processes and that behavioral development occurs as a result of cognitive processes. Hence, the study shows a parallelism in that providing education using planned science education program models in early childhood that are sensory-based and focused on process skills is efficient. These results indicate that the "Sensory-Based Science Education Program" implemented on the experimental group has a significant impact on supporting children's scientific process skills and this impact is sustained depending on the monitoring results.

Recommendations

Presented below are the suggestions in light of findings obtained by the present study: The impact of a "Sensory-Based Science Education Program" can be studied

regarding different variables such as age, cognitive development, parents' educational level, socio-economic status, and attending early childhood education institutions. This program was implemented for one term. However, it can be examined in such a way to include a full one-year process. When the children involved in the program start first grade in elementary school, the effect of their scientific process skills on their future academic progress can be studied. The program is planned focusing on fundamental and intermediate process skills. Sensory-Based Science Education Program can be planned in such a way to include all scientific process skills. In accordance with the principles and features of Sensory-Based Science Education Program, various interdisciplinary studies can be carried out based on the strong relationship between brain-senses and scientific process skills and learning.

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60-66 Aylık Çocukların Bilimsel Süreç Becerilerine Duyu Temelli Bilim Eğitimi Programının Etkisi

Atıf:

Tekerci, H. & Kandir, A. (2017). 60-66 Aylık çocukların bilimsel süreç becerilerine duyu temelli bilim eğitimi programının etkisinin incelenmesi. *Eurasian Journal of Educational Research*, 68, 239-254, <http://dx.doi.org/10.14689/ejer.2017.68.13>

Özet

Problem Durumu: Erken dönemde çocukların öğrenme isteğini, onların ilgisini çekebilecek bilişsel etkinliklerle desteklemek öğrenme sürecinin en önemli gereksinimlerindedir. Bilim eğitimi ise; çocuklar için, onları öğrenmeye iten içsel güduları ile bilişsel süreçlerini harekete geçirerek yaşadıkları dünyaya karşı, sistematik bir düşünce ve anlayış geliştirme yöntemidir. Bilimsel süreç becerileri çocukların bilimle başarılı bir şekilde ilişki kurabilmeleri açısından çok önemlidir. Bu becerilerin kazanılması ve bilimsel düşünce farkındalığının oluşması için gerekli çalışmaların ve uygulamaların yapılabileceği kritik dönem ise, erken çocukluk dönemidir. Erken dönemde bilimsel süreç becerilerinin etkin kullanımı açısından çocukların tüm duyularını kullanarak, araştırmaya ve duyu temelli deneyimler aracılığıyla çevreden geri dönüt almaya ihtiyaçları vardır.

Erken çocukluk döneminde çocukların duyu gelişimine yoğunlaşan ve bilimsel süreç becerilerinin gelişimini destekleyen yöntem ve tekniklerin kullanıldığı bir bilim eğitimi programının planlanmasında ve uygulanmasında eksiklikler ve sorunlar gözlenmektedir. Bu nedenle bu çalışma bilim eğitimi kapsamında duyu temelli çalışmalar aracılığı ile çocukların bilimsel süreç becerilerini güçlendirmeye odaklanmaktadır.

Araştırmanın Amacı: Bilim eğitimine yönelik yapılan çalışmalar, çocukların bilimsel süreç becerilerine ve sonraki akademik başarılarına etki ettiği yönünde çeşitli bilgiler sunmaktadır. Buna bağlı olarak, bilim eğitimi kapsamında geliştirilen duyu temelli bilim eğitimi programının, bilimle ilişkili temalar ve bilimsel kavramlar çocukların bilimsel süreç beceri kazanımlarını destekleyecektir. Bu da bilim okuryazarı ve bilimsel düşünebilen bir toplum oluşması beklentisini desteklemesi yönünden büyük önem taşımaktadır. Bu nedenle bu çalışmada, 60-66 aylık çocukların bilimsel süreç becerilerine duyu temelli bilim eğitimi programının etkisinin incelenmesi amaçlanmıştır.

Araştırmanın Yöntemi: Araştırma yöntemlerinin kullanımında geliştirilmiş etkili yöntemlerden biri de karma desenli yöntemdir ve çocukların bilimsel süreç becerilerini değerlendirmek amacıyla yapılan bu çalışmada karma desenli yöntem

kullanılmıştır. Deneysel nitelik özelliği taşıyan bu araştırmada, ön-test/son-test/izleme-testi kontrol gruplu deneysel desen ve nitel araştırma türleri kullanılmıştır. Araştırmanın evrenini, 2012-2013 eğitim-öğretim yılı Erzurum ili MEM'ne bağlı anaokulları/anasınıflarında görevli öğretmenler ve çocuklar ile 2013-2014 eğitim-öğretim yılı Muş ili MEM'ne bağlı anaokulları/anasınıflarında görevli öğretmenler ve çocuklar oluşturmaktadır. Çalışmada, bağımsız anaokulu ve anasınıfına devam eden 60-66 aylık 40 çocuk yer almıştır. Araştırmanın verileri; Tekerci ve Kandır (2013) tarafından geliştirilen; 48-66 Aylık Çocuklar İçin Bilimsel Süreç Becerilerini Değerlendirme Ölçeği (BSBÖ) ve Kişisel Bilgi Formu ile toplanmıştır. Araştırma verilerinin analizinde; deney ve kontrol gruplarının denkliliğini belirlemek amacıyla BSBÖ'nden elde ettikleri puan ortalamaları arasındaki farkın anlamlılığı "Bağımsız gruplarda t Testi" analizi tekniği ile test edilmiştir. Deney ve kontrol gruplarının BSBÖ ön-test sonuçlarına göre düzeltilmiş son-test puan ortalamaları arasındaki farkın anlamlı olup olmadığı, tek faktörlü kovaryans analizi (one factor ANCOVA) ile test edilmiştir. Deney grubunun BSBÖ ön-test/son-test ve izleme testi ortalama puanları arasındaki farkı test etmek için ise; tek faktör üzerinde tekrarlı ölçümler için iki faktörlü ANOVA (repeated measures) uygulanmıştır.

Araştırmanın Bulguları: Duyu Temelli Bilim Eğitim Programı'nın uygulama sürecinin değerlendirilmesi "Öğretmen Gözlem Formu" ile yapılmıştır. Elde edilen sonuçlara göre, öğretmenin etkinliklerin tamamına yakınının uygulanmasında sorun yaşamadığı görülmüştür.

Araştırmada BSBÖ'nden elde edilen verilere göre, deney/kontrol grubunun, BSBÖ son-test puan ortalamalarında deney grubu lehine anlamlı düzeyde bir fark olduğu ($p<0.05$), deney grubunun BSBÖ ön-test/son-test puan ortalamaları karşılaştırıldığında ise son-test lehine anlamlı düzeyde fark ($p<0.05$) olduğu görülmüştür. Kontrol grubunun, BSBÖ ön-test/son-test puanları karşılaştırıldığında yine anlamlı düzeyde fark ($p<0.05$) bulunmuştur. Ayrıca deney/kontrol grubunun, BSBÖ son-test puan ortalamaları karşılaştırıldığında, deney grubu lehine anlamlı düzeyde fark ($p<0.05$) belirlenmiştir. Deney grubu izleme testi puanları ile son-test puan ortalamaları karşılaştırıldığında anlamlı düzeyde fark ($p>0.05$) bulunmazken, izleme testi ile ön-test puan ortalamaları karşılaştırıldığında ise anlamlı derecede yüksek ($p<0.05$) bulunmuştur. Buna bağlı olarak, çocukların bilimsel süreç becerilerinin gelişiminin aynı zamanda bilişsel süreçlerinde gelişimine paralel ilerlediğini ve bilişsel süreçlere bağlı olarak davranışsal gelişiminde gerçekleştiğini ön plana çıkarmaktadır. Ayrıca Duyu Temelli Bilim Eğitimi Programı'nda yer alan öğrenme süreçlerinde bilimsel süreç becerilerine sıralı, aşamalı ve sistematik olarak yer verilmesi, tüm duyuların aktif ve dengeli bir şekilde kullanılması, çocukların bilimsel süreç becerileri üzerinde pozitif etki yaratmış olabilir.

Araştırmanın Sonuç ve Önerileri: Okul öncesi dönemde bilim eğitiminin temel amacı çocukların sahip oldukları bilgiden ziyade bilgiye ulaşma sürecinin nasıl işlediğidir. Bu süreç içerisinde çocukların ihtiyacı olan bilgi ve becerilerine yönelik gerçekleştirilen çoklu duyu çalışmaları, çocukların bilimsel süreç becerilerini güçlendirmekte ve maksimum düzeye çıkarmayı hedeflemektedir. Bu araştırmada

da duyu temelli gerçekleştirilen bilim eğitimi çalışmalarının çocukların bilimsel süreç becerileri üzerindeki etkisi incelenmiştir. “Duyu Temelli Bilim Eğitimi Programı”nda her bir süreç becerisine sıralı ve aşamalı olarak sistematik bir şekilde yer verilmiştir. Araştırma sonucunda, “48-66 Aylık Çocuklar İçin Bilimsel Süreç Becerilerini Değerlendirme Ölçeği” alt boyutları ön-test/son-test puan ortalamaları arasında anlamlı bir fark olduğu görülmüştür. Elde edilen tüm anlamlı farklılıklarda, son-test puanlarının ön-test puanlarına göre artış gösterdiği belirlenmiştir.

Bu bağlamda araştırma sonuçlarına dayalı olarak şu öneriler getirilebilir. Duyu Temelli Bilim Eğitimi Programı temel ve orta düzey süreç becerileri odaklı planlanmıştır. Program bütün bilimsel süreç becerilerini kapsayacak şekilde planlanabilir. Okul öncesi eğitim kurumlarında “Duyu Temelli Bilim Eğitimi Programı” ve materyallerinin kullanımına ilişkin eğitim seminerleri düzenlenerek öğretmenlerin kullanımına sunulabilir. Programda uygulamaya katılan çocuklar ilkokul birinci sınıfa geldiklerinde bilimsel süreç becerilerinin akademik gelişimlerine olan etkisi araştırılabilir. Program bir dönemlik uygulanmıştır. Bu bağlamda program bir yıllık süreci kapsayacak şekilde de ele alınabilir. Ayrıca okul öncesi öğretmenlerinin çocukların duyu temelli bilimsel süreç becerileri gelişimine ilişkin farkındalıklarını ve yöntem bilgilerini artırmak amacıyla öğretmenlere çocukların bilimsel süreç beceri gelişimlerini desteklemede yapabilecekleri çalışmalar hakkında seminerler, konferanslar vb. düzenlenerek bilgi verilebilir.

Anahtar Sözcükler: Okul öncesi, erken çocukluk, çoklu duyu, duyu eğitimi, bilimsel düşünme.



The Effects of Early Childhood Classroom Size and Duration on Development of Children **

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Quality of early childhood education, structural quality, group size, full-day program

ABSTRACT

Purpose: The numbers of early childhood education programs are dramatically increasing throughout Turkey, and the regulations to ensure quality are frequently changing. A very limited number of studies have examined the quality of Turkish ECE programs on children's development. Therefore, the purpose of this study is to identify the effects of classroom size and duration on the development of children.

Research Methods: This is a relational survey study that was realized with 836 children attending 55 public early childhood programs in Denizli. These children were selected through a cluster sampling method. Data were collected through the "Ankara Developmental Screening Inventory" and "Informational questionnaire." Data were analyzed using repeated ANOVAs, factorial ANOVA (2X4) and independent t-test techniques.

Findings: This research revealed that there were statistically significant interactions between children's development and the structural quality components of classroom size and duration of education. Our findings showed that classrooms containing 20 to 24 children had higher developmental scores than other groups. Additionally, the results indicated that children enrolled in full-day programs scored higher on the language and cognitive development subscale and total ADSI.

Implications for Research and Practice: The findings revealed that the children attending full-day programs with classroom sizes averaging 20 to 24 differed significantly from the children in other groups. This suggests that full-day programs have positive effects on children's development; therefore, it is important to increase the number of full-day programs in Turkey.

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Introduction

Recent changes in society, including the rapid rise in the female labor force and the decrease in safe play areas within neighborhoods have resulted in an increasing need for early childhood education. In aiming to increase the enrollment rate in early childhood education to developed countries, particularly the European Community and OECD countries, Turkey has improved its rate by 40% but continues to fall behind (Ministry of National Education [MoNE], 2014). Although it is very important to take measurable steps to improve national early childhood education, this alone is not sufficient to support the learning and development of young children. Providing high quality early childhood services is essential; therefore, there is an urgent need for an increase in the number of schools as well as the quality of services these schools provide for children (Ivrendi & Isikoglu Erdogan, 2015; Zembat, 2007).

A substantial body of research stated that the quality of early childhood education programs improves the developmental levels of children attending them (Burchinal, Vandergrift, Pianta & Mashburn, 2010; Duyar, 2010; Feyman, 2006; Sylva, Siraj-Blatchford, Taggart, Sammons, Melhuish, Elliot & Totsika, 2006). Since the early 1980s, research employing a rigorous and sophisticated longitudinal methodology has shown that high quality early childhood education improves a child's overall development (Ishimine & Tayler, 2014). Specifically, Barnett (2008) stated that higher program quality is associated with larger gains in cognitive and language abilities. Several other studies indicate significant correlations between the quality of programs and children's cognitive, language, socio-emotional and psycho-motor developments, early academic skills, and school readiness levels (Burchinal et al., 2010; Pianta, Barnett, Burchinal & Thornburg, 2009). A recent study documented that classroom quality was associated with better academic performance (Rudasill, Hawley, LoCasale-Crouch & Buhs, 2017).

Similarly, a number of studies have revealed that high-quality early childhood education improved the academic success of children later in life. High quality early childhood education has especially long-term positive effects on the primary school years as it promotes children's social and academic skills (Broekhuizen, Akena, Dubasa, Mulder & Leseman, 2015; Mokrova, Broekhuizen & Burchinal, 2015). In the longitudinal study by Sylva et al., (2006), a sample of 2,857 three-year-olds in 141 programs in the United Kingdom were evaluated two times at the ages of three and five. The results of this study showed that high quality educational environments are significant predictors of children's cognitive/linguistic progress. In a similar study, Dearing, McCartney and Taylor (2009) examined the relationship between the quality of programs and school readiness as well as the mathematic and reading success of 1,364 low-income children in middle childhood. Their results showed that receiving a high quality education during infancy and early childhood appeared to promote achievement indirectly via early school readiness skills. Therefore, it is important to aim to improve both quality and quantity of such programs in order to achieve higher benefits for early childhood education.

The common approach to defining quality is through two highly interrelated components: structural quality and process quality (Howes, Burchinal, Pianta, Bryant, Early, Clifford & Barbarin, 2008; Ishimine & Tayler, 2014; Peisner-Feinberg & Yazejian, 2010). Structural quality refers to objective aspects of the early childhood environment that are often regulated by government, such as the classroom size (number of children in a group) and teacher-child ratio, teacher's formal education, experience and specialized training in early childhood education or related fields, and aspects of the facility that houses the programs, such as the amount of floor space per child. The second component, process quality, refers primarily to how children experience classrooms. This includes their interactions with the adults who care for them and their exposure to materials and activities that enhance learning (Howes et al., 2008; Ishimine & Tayler, 2014; Peisner-Feinberg & Yazejian, 2010).

Previous studies examining the relationship between structural quality and children's development have investigated attributes such as duration of education, teacher-child ratio, class size, and teacher qualifications. These studies have indicated that the duration of education had significant effects on a child's development and learning (Brownell, Nickel, Chateau, Martens, Taylor, Crockett, Katz, Sarkar, Burland & Gohand, 2015; Gunindi, 2011; Nowak, Nichols & Coutts, 2009; Ozguluk, 2006). However, studies comparing full-day and half-day kindergarten programs have provided varied and complex results. In a recent longitudinal study, Brownell et al. (2015) found that attending a full-day early childhood program had long-term academic benefits for children living in low-income areas. Economically disadvantaged and at-risk children in full-day kindergarten programs are often found to have higher academic achievement than those in half-day programs (Nowak et al., 2009). On the other hand, attending child care on a full-day basis has been found to have no effect on children's school readiness and motor skills (Felfe & Zierow, 2015). Similarly, Leow and Wen (2017) found that there was no relationship between duration of education and children's social development and academic skills in Head Start programs.

Regarding classroom size, previous research has also reported mixed results. Depending on the age of the children, smaller classroom size is positively correlated with child-teacher interaction (Skalická, Belsky, Stenseng & Wichstrøm, 2015) and the quality of the classroom (Isikoglu, 2007). However, Milles and Gamoran (2006) discovered no evidence of class-size effects on student achievement in either reading or mathematics in kindergarten. In a meta-analysis, Vermeer, van IJzendoorn, Cárcamo and Harrison (2016) stated that program quality was not associated with group size. Similarly, another meta-analysis reported that class size showed nonlinear relationships with children's cognitive skills (Bowne, Magnuson, Schindler, Duncan & Yoshikawa, 2017). These research findings on class size were inconsistent. It is expected that children in a smaller class receive more teacher attention and that results in greater learning. It is obvious that there is a need for more research to support the claims about the duration of education and classroom size.

Examining the current situation in public early childhood education institutions in Turkey reveals that these programs serve mainly half-day services with an average class size of 20 children (MoNE, 2015). The Ministry of National Education (MoNE) recently published a regulation that stated "There will be 6 hours of non-stop education per day" (MoNE, 2015). Therefore, the public early childhood programs serve only half-day services in order to increase the number of children attending these schools. Recently, Canbeldek and Isikoglu Erdogan (2016) found that 81.5% of the early childhood schools in Denizli province serve half-day programs, with one session in the morning and one in the afternoon. Similarly, the MoNE regulations state that class attendance not be less than 10 and not more than 20. Otherwise, it is stated that additional branches should be opened or merged (MoNE, 2014). Based on these regulations, it is possible to conclude that the majority of the early childhood programs serve half-days and an average of 20 children per classroom.

Contrary to these current regulations in Turkey, research findings recommend that full-day programs do appear to produce long-term improvements in children's learning (Barnett, 2008; Brownell et al., 2015). While significant research has been conducted on the effects of duration and classroom size, there is little research on the current outcomes in the Turkish cultural context, and these studies are limited in terms of sample size. Thus, there is a need for study designs that allow for strong causal inferences with larger sampling. The following study addresses these gaps using a larger sample and focusing on classroom size and duration. Based on previous work related to the quality of early childhood education, the present study aims to identify the effects of classroom size and duration on the development of children. This study also aimed to shed light on the following research questions:

1. Is there a significant relationship between classroom size and the developmental levels of children?
2. Is there a significant relationship between the duration of programs and developmental levels of children?

Method

Research Design

A relational survey model was used in this study, which aimed to determine the relationship between classroom size, duration of program, and the developmental levels of children (Karasar, 2013).

Research Sample

The population of the study consisted of 8,141 children attending the public early childhood programs affiliated with the Denizli Directorate for National Education (MoNE, 2012). One thousand children attending 22 independent preschools and 38 kindergartens affiliated with primary or secondary schools were selected through a disproportionate cluster sampling method in order to represent this population. In this sampling method, each cluster in the population has an equal chance to be

selected for the sample (Karasar, 2013). After receiving legal permissions, each school was contacted by phone and informed of the purpose of the study, and an appropriate period of time was requested for data collection. As a result of this process, 55 classrooms and the 55 teachers leading these classes were included in the study.

The analysis sample consisted of 836 children (427 girls, 409 boys). The children ranged in age from 48 to 72 months and 742 of them were 5 years old. Most of the children, 681 (81.5%), were attending half-day programs. Additionally, more than 36% of the children were in classrooms consisting of 16 to 19 children. While 18.5% of children were attending classrooms of a small size (less than 15 children), 14% were in large classrooms consisting of more than 25 children.

Research Instrument and Procedure

Two instruments were used in this study. One was "Ankara Development Screening Inventory" (ADSI) developed by Savasir, Sezgin and Erol (1994). ADSI evaluates the development and skills of children aged between 0–6 years generally in line with the information obtained from their parents or teachers. The inventory had four subscales: (1) language and cognitive, (2) small motor, (3) large motor and (4) self-care with internal consistency ranging from 0.80 to 0.99 (Savasir, Sezgin & Erol, 1998). The second instrument was a questionnaire used to measure the structural quality of early childhood programs. The questionnaire had 14 open-ended questions including the age group and number of children in the classroom, the size of the classroom, the duration of education, and the socio-economic level of the neighborhood where the institution is located. These questions were filled out by the researcher through interviews with classroom teachers and principals.

After receiving legal permission, the researcher visited the schools that agreed to participate in the research. During the visits, the researcher completed the questionnaire based on initial interviews with the teachers and principals. At the same time, the teachers were provided with information about ADSI and they were asked to fill out an ADSI for each child in their classroom. Then, the completed ADSIs were gathered by the researcher on a suitable date specified by the teachers.

Validity and Reliability

The validity and reliability of two instruments used in this study were ensured before the data collection process. The first instrument, ADSI, is a well-known standard measurement tool, and its validity and reliability is established. The internal consistency for ADSI consistency ranged from 0.80 to 0.99 (Savasir, Sezgin & Erol, 1998). For the 14 open-ended questions, we asked three expert early childhood professionals to review the questions to provide evidence for the face and content validity, and 97.85% agreement was calculated from the experts' feedbacks.

Data Analysis

The data were coded, loaded, and analyzed on "SPSS 18.0" statistical package program. The study's mean scores and standard deviation values were calculated. In

order to examine the effects of classroom size and duration on children's development, we used repeated ANOVAs, factorial ANOVA (2X4), and independent t-test analyses.

Results

In order to examine the relationships among classroom size and children's developmental levels, one-way ANOVA tests were used. These results are presented in Table 1.

Table 1

The Relationship Between Classroom Size and Children's Development

	Class Size	N	M	SD	F	p	Post hoc
Language and cognitive development	10-15	155	58.3	3.11	25.86	.000	20-24 children < all other class sizes
	16-19	306	58.4	3.56			
	20-24	258	60.4	3.23			
	25 +	117	23.5	1.71			
Small motor development	10-15	155	23,3	1,92	33,03	,000	20-24 children < all other class sizes
	16-19	306	23,4	2,01			
	20-24	258	24,7	1,39			
	25 +	117	23,5	1,71			
Large motor Development	10-15	155	23.8	.396	21.26	.000	20-24 children < 16-19 and 25+
	16-19	306	23.7	.627			
	20-24	258	23.9	.213			
	25 +	117	23.6	.588			
Self-Care	10-15	155	37.4	1.55	4.96	.002	20-24 children < 16-19 and 25+
	16-19	306	37.2	1.71			
	20-24	258	37.7	1.26			
	25 +	117	37.2	2.13			
ADSI Total	10-15	155	142.9	5.41	31.84	.000	20-24 children < all other class sizes
	16-19	306	142.8	6.26			
	20-24	258	146.9	4.81			
	25 +	117	141.9	7.08			

The ANOVA results indicated that there was a statically significant relationship between all subscales and the total of ADSI and classroom size ($F_{242} = 31.847$; $p < .001$). To further understand the relationships among the four classroom size groups, follow-up tests were conducted using the Tukey method. These results showed that children in classroom size of 20-24 had higher scores on ADSI than the rest of the

children attending larger or smaller classrooms. These findings showed that the classroom size had significant effects on children's development.

To examine the relationship between duration and children's developmental levels, independent sample t-tests were conducted. These results are presented in Table 2.

Table 2

The Relationship Between Duration of Education and Children's Development

	Half day			Full day			t	p
	N	M	SD	N	M	SD		
Lang&cognitive dev.	681	58.64	3.65	155	60.04	3.227	-4.393	.000*
Small motor development	681	23.80	1.899	155	24.07	1.795	-1.592	.112
Large motor development	681	23.79	.503	155	24.07	.409	-1.299	.194
Self-Care	681	37.41	1.673	155	37.58	1.485	-1.161	.246
ADSI Total	681	143.64	6.183	155	145.54	5.746	-3.486	.001*

*p<0.001

The results revealed that there were only two statistically significant relationships between duration, language/cognitive development subscale ($t_{834} = -4, 39$; $p < 0.001$), and total ADSI scores ($t_{834} = -3, 48$, $p < 0.001$). There was no statistically significant relationship between the duration and other subscales of the ADSI.

A factorial ANOVA (2X4) with follow-ups using the Tukey procedure ($\alpha = .05$) was performed to examine the effects of classroom size and duration on the children's development level. The factorial ANOVA is suitable when one wants to study the effect of two independent categorical variables on the dependent variable. Table 3 showed the means and standard deviations for the conditions of the design.

Table 3

Descriptive Statistics on Variables of Classroom Size and Duration

	Half day			Full day			Total		
	N	M	SD	N	M	SD	N	M	SS
10-15 children	144	142.74	5.371	11	145.64	5.537	155	142.94	5.417
16-19 children	212	142.15	6.253	94	144.47	6.035	306	142.86	6.269
20-24 children	208	146.75	4.841	50	147.52	4.709	258	146.90	4.816
25 and above	117	141.92	7.085	-	-	-	117	141.92	7.085

Table 4

Factorial ANOVA Results on Classroom Size and Duration of Education

Source of Variance	Sum of Squares	df	Mean Square	F	p
Classroom size	1842.46	3	614.15	18.29	.000**
Duration	259.33	1	259.33	7.72	.006*
Class * Duration	72.87	2	36.43	1.08	.34
Error	27828.376	829	33.57		
Total	31525.96	835			

*p<0.01 **p<0.001

The results of Table 4 revealed that classroom size ($F(3, 833) = 18.29, p < 0.001$) and duration of education ($F(1, 835) = 7.72, p < 0.01$) had statistically significant effects on children's development. However, together they did not produce a statistically significant relationship on children's development level $F(2, 835) = 1.08, p > 0.05$. In other words, there was not a main effect of classroom size and duration of education (See Figure 1).

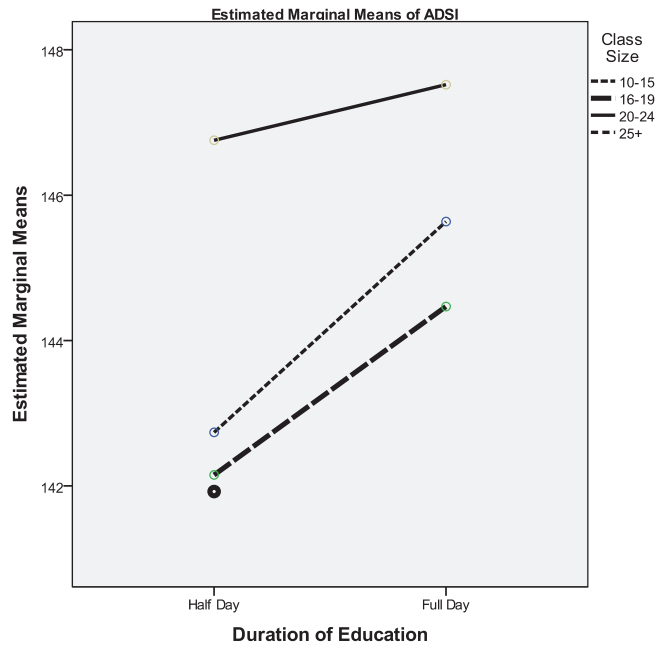


Figure 1. Interaction of Classroom Size and Duration of Education on Development Levels of Children

The effects of duration of education on classroom size are represented by three lines on the graph. On the lower line, classrooms containing 16-19 children had the lowest mean scores on ADSI either regardless of whether they were attending full- or half-day education programs. The highest line representing the classroom size of 20-24 children received the highest means regardless of whether they were attending half-day or full-day education programs.

Discussion and Conclusions

The present study examined the effects of early childhood quality on children's development. We focused on two components of structural quality: classroom size and duration of education. In line with our hypotheses, there are statistically significant interactions between children's development and the structural quality components of classroom size and duration of education. The results also showed that children attending the full-day programs with classroom sizes averaging 20 to 24 differed significantly from the children in other groups. These findings are discussed below in greater detail.

In terms of classroom size, our findings showed that classrooms containing 20 to 24 children had higher developmental scores than other groups. In other words, we found that the children in small or large classrooms had lower developmental scores than children in classrooms containing 20 to 24 children, which is a general classroom size in Turkey. Smaller classes and higher staff to child ratios are commonly expected to be better for young children, allowing more individual attention, reducing the time and effort devoted to classroom management, and reducing the number of stressful interactions. While some previous research has revealed the importance of smaller classroom size (Isikoglu, 2007; Micozkadioglu & Berument, 2011; Skalická et al., 2015) and others found no significant effects of class-size on children's learning and development (Howes et al., 2008), the present study has demonstrated a significant relationship between classroom size and developmental levels of children with the difference being in favor of large classroom size. This unexpected result can be interpreted in several ways: To begin with, it may be due to the cultural factors in our sample, including the fact that a class of 20 children is accepted as a normal classroom size. Also, the present study examined the effect of classroom size with a large data set. An experimental study in which class size has been altered for research purposes may produce more comprehensive results for the lower developmental scores in classrooms of a small size. Lastly, teacher sensitivity may be another factor that is more related than classroom size on children's development (Vermeer et al., 2016). Unfortunately, the design of the present study does not allow for the examination of the role that teacher sensitivity may play. Therefore, future research should examine the potential effects of various components of quality including teacher sensitivity.

In addition, the results of this study showed that the children attending full- day early childhood programs had higher developmental scores than the children attending half-day programs. Specifically, the present study showed that children

enrolled in full-day programs scored higher on the language and cognitive development subscale. These findings support previous research studies that found positive effects from full-day programs (Brownell et al., 2015; Clark, 2001; Nowak et al., 2009; Ozguluk, 2006; Robin, Frede & Barnett, 2006). Consequently, this finding may suggest that full-day programs have positive effects on children's development; therefore, it is important to increase the number of full-day programs in Turkey. Bearing in mind the lack of valuable resources for young children—such as play grounds, children's libraries, or museums in Turkey—the evidence from this research suggests that attending full-day programs will be beneficial for children.

Even though this research identified many important findings and implications, it has some limitations. Primarily, this study reached a limited number of children in one city, and it did not allow us to generalize findings across Turkey. Future research needs to be conducted with a bigger sample size across all seven regions of Turkey. Secondly, this study focused on the two components of structural quality of early childhood programs; however, future research could explore other components of quality.

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Erken Çocukluk Eğitiminde Sınıf Büyüklüğünün Ve Eğitim Süresinin Çocuk Gelişimi Üzerindeki Etkileri

Atıf

- Canbeldek, M. & Erdogan, N. I. (2017). The effects of early childhood classroom size and duration on development of children. *Eurasian Journal of Educational Research*, 68, 257-271, <http://dx.doi.org/10.14689/ejer.2017.68.14>

Özet

Problem Durumu: Çocuğun doğumdan ilkokula başlayıncaya kadar olan yaşantılarını içeren erken çocukluk eğitim dönemi çocuk açısından kritik bir dönemdir. Günümüzde meydana gelen kadınlarında çalışma hayatında daha çok yer alması ve çocuklar için güvenli oyun alanlarının azalması gibi toplumsal değişimler erken çocukluk eğitim kurumlarına olan ihtiyacı artırmıştır. Erken çocukluk eğitiminin verildiği okul öncesi eğitim kurumlarının sayısı ise Türkiye'de hızla artmaktadır. Erken çocukluk eğitimini iyileştirmek için niceliksel adımların atılması oldukça önemlidir. Ancak bu adımlar çocukların daha iyi öğrenmesi ve gelişmelerini destekleyebilmek açısından yeterli olmamaktadır. Bu nedenle okul sayısının artırılmasının yanı sıra çocuklara kaliteli erken çocukluk eğitim hizmetinin sunulması ve mevcut bulunan okulların kalite düzeylerinin artırılması acil bir ihtiyaçtır. Yapılan pek çok araştırma erken çocukluk eğitim programlarının kalitesinin bu programlara devam eden çocukların gelişim düzeylerini olumlu yönde etkilediğini ortaya koymuştur. Yüksek kaliteli erken çocukluk eğitimi, ayrıca çocukların sosyal ve akademik becerilerini geliştirdiği için ilkokul yıllarında ve

sonrası dahil olmak üzere uzun vadeli olumlu etkilere de sahiptir. Erken çocukluk döneminde kaliteyi açıklamaya yönelik araştırmacılar farklı tanımlamalar ortaya koysa da genel olarak kalitenin yapısal ve işlevsel kalitenin etkileşimi ve birleşimi ile gerçekleştiği üzerinde uzlaşmışlardır. Erken çocukluk döneminde kalitenin bileşenlerinden, yapısal kalitenin unsurları olarak sınıf büyüklüğü, öğretmen-çocuk oranı, öğretmenin eğitim düzeyi, hizmet yılı belirtilebilir. İkinci bileşen, işlevsel kalite ise, çocukların onlara bakan yetişkinlerle etkileşimlerini ve öğrenmeyi arttıran materyal ve faaliyetlerle etkileşimde bulunmayı içermektedir. Yapısal kalite unsurları ile çocukların gelişimi, başarı düzeyleri arasındaki ilişkiyi inceleyen çeşitli araştırmalar gerçekleştirilmiştir. Yapılan araştırmalarda yapısal kalite unsurlarından eğitim süresi ve sınıf mevcudunun da çocukların gelişim düzeylerini etkilediği sonucuna ulaşıldığı belirtilmiştir. Erken çocukluk eğitiminin kalitesinde ve çocukların gelişiminde önemli olan sınıf mevcudu ve eğitim süresinin etkilerinin bilimsel olarak incelenmesi, alan ve bu konuda karar alacak kurumlar için önemli bir ihtiyaçtır. Alan yazın taramalarında ülkemizde, okul öncesi eğitimde eğitim süresi ve sınıf mevcudu ile çocukların gelişim düzeyleri arasındaki ilişkiyi inceleyen sınırlı sayıda ve küçük örnekleme sahip araştırmalar olduğu saptanmıştır. Erken çocukluk eğitiminde, eğitim süresi ve sınıf mevcudu ile çocukların gelişim düzeyi ilişkisini inceleyen büyük örneklemlerle araştırma sayısının sınırlı olması ise bu araştırmanın önemini artırmaktadır.

Araştırmanın Amacı: Bu çalışmanın amacı, erken çocukluk eğitiminde yapısal kalite unsurlarından olan sınıf büyüklüğünün ve eğitim süresinin çocuk gelişimi üzerindeki etkilerini belirlemektir.

Araştırmanın Yöntemi: Erken çocukluk döneminde okul kalitesinin çocuk gelişimine etkisini inceleyen bu araştırma da ilişki tarama modeli kullanılmıştır. Araştırmaya Denizli İl Millî Eğitim Müdürlüğüne bağlı 55 okul öncesi eğitimi sınıfı ve bu okullarda eğitim görmekte olan beş- altı yaşındaki 836 çocuk küme örnekleme yöntemi ile seçilmiştir. Araştırma verileri "Ankara Gelişim Tarama Envanteri (AGTE)" ve "Okul Öncesi Eğitim Kurumu Yapısal Kalitesi İçin Bilgi Formu" kullanılarak toplanmıştır. Okul Öncesi Eğitim Kurumu Yapısal Kalitesi İçin Bilgi Formu; okul öncesi eğitim kurumunun yapısal kalitesini ölçmek için 14 adet açık uçlu soru sorudan oluşmaktadır. Bu sorular arasında eğitim süresi, öğretmenin mezun olduğu lise türü, mezun olduğu okul, hizmet yılı, sınıftaki çocukların yaş grubu ve sayısı, sınıfın büyüklüğü, kurumun bulunduğu yerin sosyo-ekonomik düzeyi gibi sorular yer almaktadır. Bu sorular araştırmacı tarafından sınıf öğretmenlerine ve okul idaresine sorularak doldurulmuştur. Verilerin toplanabilmesi için yasal izin alınmış ve örnekleme dahil olan okulların yöneticilerine telefon ya da birebir görüşme yoluyla araştırma hakkında bilgi verilmiş ve yaş grubu uygun olan sınıfların gözlenebilmesi için öğretmen ve yöneticiler bilgilendirilmiş, katılmayı kabul eden okullara ziyaretler planlanmıştır. Ardından kurumlardaki öğretmenlerle görüşülerek, gerçekleştirilecek uygulamanın amacı ve nasıl olacağı anlatılmıştır. AGTE'nin nasıl doldurulacağı konusunda öğretmenlere uygulamalı şekilde bilgi verilmiş ve onlardan sınıflarındaki her bir çocuk için AGTE'yi doldurmaları istenmiştir. Öğretmenlerle birlikte belirlenen uygun bir tarihte doldurulan ölçekler

araştırmacı tarafından geri alınmıştır. Araştırma sonucunda elde edilen veriler, "SPSS 18.0" istatistik paket programına kodlanarak yüklenmiş ve analiz edilmiştir. Çalışma verilerinin analizinde, bağımsız t-testi, tek yönlü ANOVA ve faktörel ANOVA (2X4) teknikleri kullanılmıştır.

Araştırmanın Bulguları: Yapılan araştırma, yapısal kalite unsurlarından sınıfta bulunan çocuk sayısı ve eğitim süresi ile çocukların gelişimleri arasında istatistiksel olarak anlamlı ilişki olduğunu ortaya koymuştur. Araştırmanın bulguları, 20- 24 arasında çocuk bulunan sınıflarda eğitim gören çocukların diğer gruplarda eğitim gören çocuklardan daha yüksek gelişim puanı aldığını göstermiştir. Araştırmada, tam gün erken çocukluk eğitimi programlarına devam eden çocukların dil-bilişsel gelişim alt boyutu puanları ile toplam AGTE puanlarının yarım gün erken çocukluk eğitimi programına devam eden çocuklardan daha yüksek olduğu bulunmuştur. Ayrıca eğitim süresi ve sınıf mevcudunun çocukların gelişim puanına birlikte olan etkisi incelendiğinde ise anlamlı ortak bir etkinin olmadığı belirlenmiştir.

Araştırmanın Sonuçları ve Önerileri: Araştırma sonuçları, sınıfta bulunan çocuk sayısı 20- 24 arasında eğitim kurumlarına devam eden çocukların gelişim puanlarının diğer gruplardaki çocuklardan anlamlı derecede farklı olduğunu ortaya koymuştur. Ayrıca tam gün erken çocukluk eğitimi programlarının çocuk gelişimi üzerinde olumlu etkileri olduğunu göstermektedir. Bu nedenle Türkiye'de tam gün program sayısını artırılması önemlidir. Erken çocukluk döneminde çocukların kaliteli erken çocukluk eğitimi programlarına devam etmeleri onların gelişimlerini destekleyecektir. Özellikle sosyo-ekonomik şartları elverişsiz ortamlarda büyüyen çocukların yaşamlarının başından itibaren dezavantaj yaşamaları ve gelişimsel olarak kritik dönemde gerekli becerileri kazanmaları için kaliteli tam gün okul öncesi eğitimi oldukça yararlı olacaktır. Konuyla ilgili çalışacak araştırmacılara yönelik olarak da araştırmaların farklı il ve bölgelerde daha çok sayıda çocukla yapılması önerilmektedir. Ayrıca, okul öncesi eğitimin kalitesi ve çocukların gelişim düzeyleri düzenli ve kurumsal olarak ölçülmeli ve kalite düzeyi düşük olan okullar için acil önlemler alınmalıdır. Erken çocukluk eğitimi veren kurumlarda mutlaka sistemli ve bilimsel kalite değerlendirme sistemlerinin oluşturulması önerilmektedir.

Anahtar Sözcükler: Erken çocukluk eğitiminin kalitesi, yapısal kalite, grup büyüklüğü, tam gün.

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		<p>available from http://www.tandf.co.uk/journals/authors/rereabstracts.asp</p> <p>Kaynakça'dan sonra 750-1000 sözcükten oluşan Türkçe yapılandırılmış öze yer verilmiştir. Türkçe yapılandırılmış öz <i>Problem Durumu, Araştırmanın Amacı, Araştırmanın Yöntemi, Araştırmanın Bulguları, Araştırmanın Sonuçları ve Önerileri</i> başlıklarını içermektedir. Bu başlıklar tartışma yazıları için: <i>Çalışmanın Temeli, Çalışmanın Amacı, Kanıt Kaynakları, Ana Tartışma ve Sonuçlar</i> şeklinde olabilir. Daha fazla bilgi için; http://www.tandf.co.uk/journals/authors/rereabstracts.asp</p>
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20	<input checked="" type="checkbox"/>	<p>Citations in the text of the document include the author's surname, the year of publication, and, when there is a specific quote from a source used, a page number where the quote is located in the text.</p> <p>Example:</p> <p>Nothing seemed so certain as the results of the early studies (Tatt, 2001, p. 445). It was precisely this level of apparent certainty, however, which led to a number of subsequent challenges to the techniques used to process the data (Jones & Wayne, 2002, p. 879). There were a number of fairly obvious flaws in the data: consistencies and regularities that seemed most irregular, upon close scrutiny (Aarns, 2003; West, 2003, p. 457).</p> <p>With studies by two authors, always include both author names:</p>

		<p>(Anderson & Bjorn, 2003)</p> <p>As Anderson and Bjorn (2003) illustrated in their recent study</p> <p>As recently as 2003, a prominent study (Anderson & Bjorn) illustrated</p> <p>When a study has 3, 4, or 5 authors, include the names of all the authors the first time the work is cited:</p> <p>(Anderson, Myers, Wilkes, & Matthews, 2003)</p> <p>For all subsequent citations of this work, use "et al.":</p> <p>(Anderson et al., 2003)</p> <p>When a work has 6 or more authors, use et al.:</p> <p>(Bell et al., 2003)</p> <p>For unsigned works, include the title, enclosed in parentheses. Put quotation marks for short work titles, and italicize the titles of reports, books, and other significant works:</p> <p>("Recent Developments," 2004)</p> <p>(Dictionary of Tetrathalocigistic Diseases, 2004)</p> <p>Metin içindeki atıfları üstte verilen örneklere uygundur.</p>
21	<input checked="" type="checkbox"/>	<p>Three levels of headings are used: Level 1, Level 3 and Level 4. The headings are formatted as follows:</p> <p>Centered Uppercase and Lowercase Heading (Level 1)</p> <p><i>Flush Left, Italicized, Uppercase and Lowercase Side Heading</i> (Level 3)</p> <p><i>Indented, italicized, lowercase paragraph heading ending with a period.</i></p> <p>Start writing after the period (Level 4).</p> <p>Aday makale içerisinde üç farklı düzey başlık kullanılmıştır. Düzey 1, Düzey 2, Düzey 3. Başlıklar bu düzeylere uygun olarak aşağıdaki şekilde biçimlendirilmiştir:</p> <p>Ortalı ve Her Sözcüğün İlk Harfi Büyük Yazılmış Başlık (Düzey 1)</p> <p><i>Tam Sola Dayalı, İtalik ve Her Sözcüğün İlk Harfi Büyük Yazılmış Başlık</i> (Düzey 3)</p> <p><i>İçeriden, italik, tamamı küçük harflerle yazılmış ve nokta ile bitten başlık.</i></p> <p>Noktadan sonra normal metin yazımına devam edilmeli (Düzey 4).</p>
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	<p>Bollen, K. A. (1989). <i>Structural equations with latent variables</i>. New York: Wiley.</p> <p>Johnson, D. W., & Johnson, R. T. (1990). Cooperative learning and achievement. In S. Sharan (Ed.), <i>Cooperative learning: Theory and research</i> (pp. 173-202). New York: Praeger.</p> <p>Turkish References Only:</p> <p>Çınkır, Ş., & Çetin, S. K. (2010). Öğretmenlerin okullarda mesleki çalışma ilişkileri hakkındaki görüşleri [Teachers' opinions about the professional working relationships in schools]. <i>Kuram ve Uygulamada Eğitim Yönetimi</i>, 16(3), 353-371.</p> <p>Article in an Internet-only journal/Periodical, database</p> <p>Fredrickson, B. L. (2000, March 7). Cultivating positive emotions to optimize health and well being. <i>Prevention & Treatment</i>, 3, Article 0001a. Retrieved November 20, 2000, from http://journals.apa.org/prevention/volume3/pre0030001a.html</p> <p>More information is available from: http://citationonline.net/CitationHelp/csg04-manuscripts-apa.htm#references</p> <p>Kaynakçanın yazımı üstte verilen örneklere uygundur.</p>
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