

EXAMINING THE EFFECT OF TEACHERS' ATTITUDES TOWARDS STATISTICS ON THEIR ATTITUDES TOWARDS POSTGRADUATE EDUCATION

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Abstract

The present study aims to examine the effect of teachers' attitudes towards statistics on their attitudes towards postgraduate education. Accordingly, the "Attitude Towards Statistics Scale" and the "Attitude Towards Postgraduate Education Scale" were applied to 511 teachers working in different fields of primary schools, middle schools, and high schools in the spring semester of the 2018-2019 academic year. The study was designed in the survey model and the convenience sampling method was used in sample selection. In the analysis of the sub-problems of the study, parametric analysis techniques were used by determining the kurtosis and skewness coefficients between -1.5 and +1.5. As a result of the study, it was determined that teachers possessed a positive attitude towards statistics ($\bar{X}=3.66$; $Sd=.705$) and postgraduate education ($\bar{X}=3.72$; $Sd=.727$) and additionally, there was a high correlation between attitudes towards statistics and postgraduate education ($p<0.01$; $r=.972^{**}$). Furthermore, it was concluded that there was not a statistically significant difference between variables such as gender, which is a demographic variable, participation in scientific research, and educational background and attitudes towards statistics and postgraduate education ($p>0.05$).

Keywords: Statistics, Postgraduate, Teachers.

INTRODUCTION

In today's world, where technological developments are rapidly influenced by knowledge, training qualified workforces has become an important subject for countries that are in possession of knowledge as a requirement of becoming stronger in the fields of technology, politics, art, culture and education and gaining a place in the developing world. In order to fulfill these requirements, it is necessary to develop qualified education services that can adapt to the rapid changes in knowledge and technology and allow for their implementation (Alhas, 2006; Arı, Pehlivanlar & Çömek, 2005; Karakütük, 2001). For these reasons, a major responsibility falls to universities, which are institutions that contribute to the development of society by communicating knowledge and technology to the public (Köksalan, 1999). While universities are expected to undertake the training of the said qualified workforce in general, this task is expected to be fulfilled through postgraduate education programs in particular. Therefore, postgraduate education is a matter of significance in terms of national development and the training of highly qualified workforces (Aslan, 2007). When the studies in the literature on the definition of postgraduate education and its acquisitions for individuals were examined; it was found that Kutluca, Canbulat & Çakmak (2007) defined postgraduate education as a process in which individuals who possess qualifications of research and examination participate voluntarily while Sevinç (2001) stated that it played an important role in national development with the training of highly qualified workforces that are needed by the country. The Council of Higher Education [YÖK] (2016) stated that it provided an in-depth working area for individuals in a particular field over a certain period of time, and that the courses and qualifications obtained throughout this educational process are generally regarded as true learning experiences by many individuals. Sayan & Aksu (2005) stated that it is an education program that trains individuals who are creative, productive and aware towards the problems of the country while Battie & Steelman (2014) defined it as a process that allows to acquire a high level of competence regarding the knowledge and technical skills within the scope of a certain field, to establish career development and to achieve the professional standards required. Cooley (2008) stated that the process developed the diversity of academic experience related to the workfields of individuals and İltar (2019) stated that it is an effective way in

obtaining new knowledge and skills, and career-planning by specializing in a particular field due to the fact that the process is perceived as a prerequisite for professionalization by license graduates in all disciplines despite not being compulsory. Postgraduate education is an important factor in career planning, which is a determining factor of vocational development (Harvey, 2009). Postgraduate experiences provide acquisitions that lead to vocational competence in the profession of teaching and greater academic autonomy in the field while postgraduate studies significantly affect the personal relationships, academic and social lives of teachers and increase their awareness and self-efficacy towards professional development (Er & Ünal, 2017; Sabancı, 2011). In line with the needs and expectations of the 21st century, teachers are required to constantly renew themselves and participate in activities towards achieving certain academic and social development objectives (Harvey, 2009). By undergoing postgraduate education, teachers are able to improve their self-efficacy and reliability in the practices within their field of specialization and develop their professional stance or academic career (YÖK, 2007). Although various methods and techniques are used to find solutions to problem statements, which are addressed in postgraduate education, intensive use of statistical analyses is required in the analysis of data obtained regarding problem statements. Through statistics; brief and effective information regarding an event or situation can be obtained. Statistics can be used as the primary tool to reveal scientific information and determine the validity and reliability of study results, and allows for the use of a common language in the expression of the data obtained. Due to this wide area of use, statistics teaching is carried out over a wide range from primary to postgraduate education (Akkoc & Yeşildere-İmre, 2015). Students should be instilled with the idea that the knowledge and culture of statistics will be useful to them regardless of their level of education (Girginer, Kaygısız & Yalama, 2007). Statistics should be widely taught for the analysis and interpretation of the data collected in accordance with the purpose of a given study (Eskici, 2013). Knowing how to interpret the answers obtained in a certain study using suitable statistical methods is the main purpose of statistics (Köklü, Büyüköztürk & Bökeoğlu, 2006). While statistics is important to better understand and evaluate certain information in daily life, it is also important in terms of solving statistical problems, drawing conclusions and explaining the reasons behind the conclusions (Garfield, 1995). Statistics is the numerical expression of the analysis of the data collected in light of multiple variables that are obtained in reference to the problem in question (Healey, 2009). There is a relationship between performance in statistics classes and attitude and self-efficacy towards statistics (Schuyten & Dekeyser, 2007).

When the related literature was examined, it was determined that statistics are an important subject in terms of the scientific analysis of the problems addressed in the process of postgraduate education. From this viewpoint, the subject was decided to be studied as it was considered to be necessary to examine the nature of the relationship between teachers' attitudes towards postgraduate education and statistics.

PURPOSE

The present study aims to determine teachers' attitudes towards statistics and postgraduate education in terms of demographic variables and to seek answers to the following sub-problems.

- 1-At what level are the teachers' attitudes towards Statistics?
- 2-At what level are the teachers' overall attitudes towards Postgraduate Education?
- 3-Is there a correlation between the teachers' attitudes towards Statistics and Postgraduate Education?
- 4-Is there a statistically significant relationship between the Teachers' Overall Attitudes Towards Statistics and the demographic variables of gender, participation in scientific research and educational background?
- 5-Is there a statistically significant difference between the Teachers' Overall Attitudes Towards Statistics and the variable of teaching level?
- 6-Is there a statistically significant relationship between the Teachers' Overall Attitudes Towards Postgraduate Education and the demographic variables of participation in scientific research and educational background?

7-Is there a statistically significant difference between the Teachers' Overall Attitudes Towards Postgraduate Education and the variable of teaching level?

METHODOLOGY

The present study was designed in the survey model. Survey models are administered on the whole population or a sample extracted from the population in order to make a generalization about the population (Karasar, 1999).

Population and Sample

The sample of the study was created using the non-probability convenience sampling method. Convenience sampling is performed on volunteering individuals who are close to hand and easy to reach (Erkuş, 2013). The population of the present study consists of teachers working in primary schools, middle schools, and high schools attached to Ardahan Provincial Directorate of National Education in the fall semester of the 2017-2018 academic year. The sample size was calculated using the program GPower 3.0.10 for 80% power and a significance level of 0.05, and found as 176. However, the study was carried out with 511 teachers, which is above the minimum required sample size. Table 1 shows the demographic variables for the participating teachers.

Table 1: Demographic variables

Variable		Frequency (f)	Percentage (%)
Gender	Male	300	58.7
	Female	211	41.3
Participation in Scientific Research	Yes	116	22.7
	No	395	77.3
Educational Background	Undergraduate	444	86.9
	Postgraduate	67	13.1
Teaching Level	Primary School	206	40.3
	Middle School	241	47.2
	High School	64	12.5

When Table 1 was examined, it was determined that 300 of the teachers were male and 211 were female, 116 have previously participated in scientific researches and 395 have not participated in any scientific research before while 444 of the teachers had undergraduate education and 67 had postgraduate education. Finally, in terms of teaching levels, it was determined that 206 of the teachers worked at the primary school level, 241 worked at the middle school level and 64 worked at the high school level.

Data Collection Tools

Attitude Towards Statistics Scale

When the factors of the "Attitude Towards Statistics Scale" developed by Yaşar (2014) were examined, it was observed that the first factor (the Relationship of Statistics with Professional Life) explained 30.043%, the second factor (Anxiety-Fear Towards Statistics) explained 10.036%, the third factor (Enjoying Statistics) explained 7.787%, the fourth factor (the Importance of Statistics) explained 5.151% and the fifth factor (Perceived Difficulty of Statistics) explained 3.948% of the total variance. These five factors explained 56.301% of the total variance. Since the difference between the eigenvalue of the first factor (10.019) and the eigenvalue of the following second factor (3.980) was more than double and the scale measured a one-dimensional or singular psychological structure, the scale was assumed to have construct validity. Another statistic that supports this is that the calculated Cronbach-Alpha coefficient of the scale ($\alpha=0.927$) was relatively high. This high Cronbach-Alpha coefficient may indicate a very high level of agreement between the attitude items of the scale and, therefore, a single psychological structure. The reliability coefficients of the factors of the "Attitude towards Statistics Scale" were calculated as ($\alpha =0.862$) for the first factor, ($\alpha=0.837$) for the second

factor, ($\alpha = 0.839$) for the third factor, ($\alpha = 0.749$) for the fourth factor and ($\alpha = 0.810$) for the fifth factor.

Attitude Towards Postgraduate Education Scale

In the study conducted by Ünal & İltir (2010), the overall Cronbach-Alpha reliability coefficient of the scale was calculated as .95 and the KOMO value was calculated as .92. The scale is a 5-point Likert scale, which is widely used to measure attitude. Many attitude scales were developed for the said purpose. The attitude items in the data collection tool were scored in five degrees: "Strongly Agree", "Agree", "Neutral", "Disagree" and "Strongly Disagree". Statistical techniques were used in the analysis of these items. In the interpretation of the items, numerical values were assigned to the options: 5.00-4.21 for "Completely Agree", 4.20-3.41 for "Agree", 3.40-2.61 for "Neutral", 2.60-1.81 for "Disagree" and 1.80-1.00 for "Completely Disagree". It was determined that the scale, which is used to determine teachers' attitudes towards postgraduate education, is a three-factor scale with a total of 18 items consisting of 9 items in the "Function" factor, 6 items in the "Eagerness" factor and 3 items in the "Necessity" factor. Additionally, it was determined that the first sub-dimension of the scale explained 26.338%, the second sub-dimension explained 18.249% and the third sub-dimension explained 11.881% of the total variance and the overall scale explained 56.467% of the total variance.

Data Analysis

The data obtained from the "Attitude Towards Statistics Scale" and the "Attitude Towards Postgraduate Education Scale" were interpreted at a significance level of ($p < 0.05$). It was determined that the study data were normally distributed as their Skewness and Kurtosis values ranged between -1.5 and +1.5. This is considered to be the acceptable range of Skewness and Kurtosis for the normal distribution of data (Tabachnick and Fidell, 2013). It was decided to use parametric statistical methods in the analysis of the study's sub-problems. Table 2 shows the data on the Skewness and Kurtosis values regarding the normal distribution of the data obtained.

Table 2: Skewness and Kurtosis values of the data

N	\bar{X}	Ss	Skewness	Kurtosis
511	3.72	.727	-.816	1.009

When Table 2 was examined, it was determined that the Skewness and Kurtosis values of the data ranged between -.816 and 1.009, and the data was normally distributed.

FINDINGS

Table 3: Arithmetic mean and standard deviation values on the teachers' overall attitudes towards statistics

Overall Attitude	\bar{X}	Sd
	3.66	.705

When Table 3 was examined, it was found that the mean arithmetic value regarding the teachers' overall attitudes towards statistics ($\bar{x} = 3.66$) was high. Considering the numerical range values calculated for the overall scale, it was determined that the value of 3.66 was within the range of "Agree" and, therefore, the teachers' attitudes were positive.

Table 4: Arithmetic mean and standard deviation values on the teachers' overall attitudes towards postgraduate education

Overall Attitude	\bar{X}	Sd
	3.72	.727

When Table 4 was examined, it was found that the mean arithmetic value regarding the teachers' overall attitudes towards postgraduate education ($\bar{x} = 3.72$) was high. Considering the numerical range values calculated for the overall scale, it was determined that the value of 3.72 was within the range of "Agree" and, therefore, the teachers' attitudes were positive.

Table 5: The correlation value between the teachers' attitudes towards statistics and postgraduate education

Correlation	\bar{X}	Sd	r
Attitude Towards Statistics	3.66	.705	.972**
Attitude Towards Postgraduate Education	3.72	.727	

** $p < .01$

When Table 5 was examined, it was found that there was a very high correlation ($r = .972^{**}$) value between the teachers' attitudes towards statistics and postgraduate education.

Table 6: The analysis results on the relationship between the teachers' overall attitudes towards statistics and the variables of gender, participation in scientific research and educational background

Variable	Group	N	\bar{X}	Sd	df	t	p
Gender	Male	300	3.62	.697	509	-1.745	.08
	Female	211	3.73	.713			
Participation in Scientific Research	Yes	116	3.60	.738	509	-1.102	.27
	No	395	3.68	.695			
Educational Background	Undergraduate	444	3.55	.699	509	1.469	.142
	Postgraduate	67	3.68	.737			

* $p < .05$

When Table 6 was examined, it was found that there was no statistically significant difference between the teachers' attitudes towards statistics and the variables of gender, participation in scientific research and educational background ($p > 0.05$).

Table 7: The analysis results on the relationship between the teachers' overall attitudes towards statistics and the variable of teaching level

Variable	N	\bar{X}		Sum of Squares	df	Mean Square	F	p
Primary School	206	3.73	Between Groups	2.150	2	1.075	2.170	.115
Middle School	241	3.60	Within Groups	251.659	508	.495		
High School	64	3.71	Total	253.809	510			

* $p < .05$

When Table 7 was examined, it was determined that there was no statistically significant difference between the teachers' attitudes towards statistics and the variable of teaching level ($p > 0.05$; $F = 2.170$).

Table 8: The analysis results on the relationship between the teachers' overall attitudes towards postgraduate education and the variables of gender, participation in scientific research and educational background

Variable	Group	N	\bar{X}	Sd	df	t	p
Gender	Male	300	3.68	.718	509	-1.241	.215
	Female	211	3.77	.740			
Participation in Scientific Research	Yes	116	3.66	.749	509	-.928	.354
	No	395	3.73	.721			
Educational	Undergraduate	444	3.73	.720		1.238	.216

Background					509
	Postgraduate	67	3.62	.771	

* $p < .05$

When Table 8 was examined, it was determined that there was no statistically significant difference between the teachers' attitudes towards postgraduate education and the variables of gender, participation in scientific research and educational background ($p > 0.05$).

Table 9: The analysis results on the relationship between the teachers' overall attitudes towards postgraduate education and the variable of teaching level

Variable	N	\bar{X}		Sum of Squares	df	Mean Square	F	p
Primary School	206	3.78	Between Groups	1.604	2	.802		
Middle School	241	3.66	Within Groups	268.514	508	.529	1.518	.220
High School	64	3.74	Total	270.118	510			

* $p < .05$

When Table 8 was examined, it was determined that there was no statistically significant difference between the teachers' attitudes towards postgraduate education and the variable of teaching level ($p > 0.05$; $F = 1.518$).

RESULTS AND DISCUSSION

As a result of the present study, it was determined that the teachers possessed a positive attitude towards statistics and postgraduate education. Ünal & İltir (2010) measured the attitudes of teacher candidates towards receiving postgraduate education at the level of "Agree" while Çevik & Yiğit (2009) concluded that teacher candidates had a high rate of receiving postgraduate education. It was found that there was a high level of positive correlation between teachers' attitudes towards statistics and postgraduate education.

Additionally, it was found that there was no statistically significant difference between teachers' attitudes towards statistics and postgraduate education and variables such as gender, participation in scientific research, educational background and teaching level. Based on this result, it was concluded that the aforementioned variables did not have a determinative effect on teachers' attitudes towards statistics and postgraduate education. In the previous studies in the literature, which were generally conducted with teacher candidates; Ören, Yılmaz & Güçlü (2012) found that there was no statistically significant relationship between teacher candidates' gender and their willingness to receive postgraduate education, Sivacı, Gülbahar & Çöplü (2018) found that there was no statistically significant difference in the attitude towards postgraduate education based on the variable of gender, and İlhan, Öner Sünkür & Yılmaz (2012) concluded that there was no statistically significant difference between the variable of gender and teacher candidates' attitudes towards the function of postgraduate education.

When the changes in teachers' attitudes towards statistics based on the arithmetic mean values of their demographic variables were examined, it was found that the female teachers, the teachers who did not participate in the study, the teachers who received postgraduate education, and the teachers working at the high school level had higher score averages regarding the attitude towards statistics.

When the changes in teachers' attitude towards postgraduate education based on the arithmetic mean values of their demographic variables were examined, it was found that the female teachers, the teachers who have not previously participated in any scientific research, the teachers who received undergraduate education and the teachers who worked at the primary school level had

higher score averages regarding the attitude towards postgraduate education. In the previous studies in the literature, which were generally conducted with teacher candidates; İltter (2010) found that female teacher candidates had higher scores regarding the attitude towards postgraduate education compared to male teacher candidates, and Sivacı, Gülbahar & Çöplü (2018) found that female teacher candidates had higher total scores and score averages from the "Attitude Towards Postgraduate Education Scale" compared to male teacher candidates.

SUGGESTIONS

1. In-service training programs should include activities for improving teachers' attitudes towards statistics.
2. Teachers should be encouraged to develop a more positive attitude towards postgraduate education through appropriate informative training activities.
3. In-service training programs conducted with primary-school and middle-school teachers should include activities for improving teachers' attitudes towards statistics.
4. Middle-school and high-school teachers should be encouraged to develop a more positive attitude towards postgraduate education through comprehensive studies on postgraduate education activities.

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