

# **Development of a Scale to Measure Teacher Candidates' Attitudes toward Research**

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## **ABSTRACT**

The purpose of this study is to develop a "Scale of Attitudes toward Research" (SAR) to quantify the attitudes of teacher-candidates towards research. The SAR was applied to 359 (93 female, 266 male) teacher-candidates from the Dicle University, Siirt Faculty of Education in Turkey. In analyzing the data, the Varimax rotation technique was utilized along with principal component analysis. From a draft scale of 60 items, a 31 item scale was developed, 22 of which had positive connotations and 9 of which had negative connotations. Cronbach's Alpha reliability coefficient of the scale was found to be 0.897. The sub-categories of the scale were named "interest towards research," "importance," "motivation," "efficacy," and "concern."

*Key Words:* Teacher-Candidates, Research Attitudes, Scale Development

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## INTRODUCTION

Research can be viewed in a number of ways: as a mere tool used to expand knowledge (Marczyk, 2005), as a process of data collection, analysis, and interpretation (Demirel, 2001), or as an end in itself which in turn guides advances in academic and practical disciplines (Brew, 2001). Research is an essential element at all institutions of higher education, both for the academics who work there and for their students.

In Turkey, a conscious approach to the concept of research, its applications, and the necessity of teaching students in the field of education about research was first seen in the Pedagogy Department of Gazi Institute of Education in the 1950s. In 1953, the Ministry of National Education founded the first institute that was active in this field, called the "Bureau of Testing and Research." Today, there are many research institutes and participants in research studies. In addition, the faculty members in some colleges and universities added subjects such as "Research Techniques" and "Education Research" to their curriculum. In subsequent regulations, YÖK (The Higher Education Council) removed these courses from the curriculum of teacher-training institutions (Kaptan, 1998). However, as of the 2006–2007 academic year, it was approved to add courses such as "Scientific Research Methods" to the curriculum.

The nature of research lends itself to being thought of in a variety of ways. Therefore, it is not surprising that attitudes toward research also vary greatly, as well as the individual ability to conduct research. Attitudes toward research training have been explored by a number of researchers (Kağıtçıbaşı, 1999; Karasar, 2000; Bordens & Horowitz, 2002; Saraçoğlu, Başer, Yavuz & Narlı, 2004) who have described how predispositions and prior experiences influence these attitudes. According to Kağıtçıbaşı (1999), attitude is a tendency attributed to an individual that constitutes his thoughts, feelings, and behaviors concerning a psychological object in an organized manner. Karasar (2000) notes that the basis of research training is: possessing and manifesting the scientific method, having the technical information, skills, and attitudes required, and an understanding of its place in individual and social life. According to Bordens & Horowitz (2002), the concept of attitude forms the basis of explaining our thoughts and ideas, as well as our reactions to other individuals, situations, and concepts. To Saraçoğlu et al. (2004), attitude is a cognitive, perceptive, and behavioral pre-tendency reaction of an individual, which the individual organizes based on experience, motivation and knowledge concerning himself or any social issue, object, or event in his environment.

In a more recent study, Korkmaz et al. (2011) developed an inventory to detect the attitudes of pre-service teachers toward scientific research. The data for this study was collected from 713 students who were studying in the Faculty of Education at the Ahi Evran University. The study resulted in a four-factor, 30-item scale. Two of the factors indicated negative attitudes and the other two positive. The factors were: "Unwilling to Help Researchers" (eight items), "Negative Attitude toward Research" (nine items), "Willing to Help Researchers" (seven items) and "Positive Attitude toward Research" (six items). The results of their explanatory factor analysis showed that these factors, respectively, explained 13.491%, 12.597%, 10.910% and 9.343% of the total variance. In this paper, the authors also discussed the validity and the reliability of their inventory.

Papanastasiou (2005) developed an analytic scale in an effort to assign numeric scores to research attitudes. Her five-factor scale, with its 52-item survey, formed the basis of the research for this paper.

This study aimed to quantitatively determine the attitudes of a group of teacher-candidates towards the topic of research. The data was then used to develop a uniform “Scale of Attitudes toward Research” (SAR), a Likert-type scale which can be applied by future researchers and educators to other groups.

## METHOD

### Target Population

The population used in this study consisted of teacher candidates majoring in Elementary School Class Master Education, Social Sciences Education, Science Education, and Mathematics Education in the Siirt Faculty of Education at Dicle University during the spring semester of the 2006–2007 academic years. No sample selection was needed since the study was conducted directly on the population. Teacher candidates enrolled in faculties of education were chosen as the target group because we assumed their attitudes toward research would be clear-cut.

Initially, 370 senior students (98 female and 272 male) from the target departments took part in the study. About 59.6% of those students were from the Elementary School Class Master Education, 8.9% from the Social Sciences Education, 9.2% from the Science Education, and 22.3% from the Mathematics Education Department.

In addition to the survey questions, the students were also asked to answer questions concerning their parents' education level and their self-reported level of socioeconomic status. Even though both of these questions were optional, a majority (97% students) chose to answer them. The results for highest level of parent education are: Illiterate (mother: 54.6%, father: 14.8%), Elementary School (mother: 33.4%, father: 39.4%), Middle School (mother: 3.1%, father: 9.1%), High School (mother: 5.8%, father: 18.9%), University (mother: 2.2%, father: 14.7%), Advanced Degrees (mother: 0.9%, father: 3.1%). As for the self-reported level of socioeconomic status, the students chose from: below average, average and above average. Below average was selected by 34.8% of the students, 60.2% selected average, and 5% selected above average as their socioeconomic status.

Because these students were admitted into the program before the “Scientific Research Methods” course was added to the curriculum in 2006, they did not take any research related courses.

### Data Gathering Instrument

In developing the SAR, we tracked the determination of scale items, preparation and implementation of a draft scale, and determination of reliability and validity stages.

### Scale Item Determination

After review of the relevant literature and consideration of the attitude scales used in current studies, the “Attitudes toward Research” (ATR) scale developed by Papanastasiou (2005) was selected for use. In order for the researchers of this study to develop new items, the

following six open-ended questions were asked of 70 teacher candidates concerning their feelings, thoughts, and behaviors towards research:

1. What are your thoughts on the usefulness of research in a career?
2. Do you have negative feelings (such as anxiety, stress, concern, lack of interest, confusion) about research and its use?
3. Do you have positive feelings (such as excitement, interest, fun, and discovery) about research and its use?
4. What do you think about the relevance of research to life?
5. What kind of difficulties do you think you can face when doing research?
6. Write an essay describing your feelings and thoughts towards research.

The resulting statements of the teacher candidates were systematically selected to form a pool of 60 items to be considered for use in a draft survey.

### **Scale Preparation and Implementation**

In the 60 item draft survey, 30 of the items had positive connotations with the remaining 30 items exhibiting negative connotations. In order for the statements in the scale not to be misleading, positively (or negatively) worded items were not placed one after another – they were alternated. Each item could produce one of five responses, each of which corresponded to a numeric score. The responses and their scores were: 1-Strongly disagree, 2-Disagree, 3-Neither agree nor disagree, 4-Agree, 5-Strongly agree.

Given the 60 items in the survey, possible survey scores could range from 60 to 300. See Appendix A for the 60 item draft survey translated from Turkish to English.

All 370 students from the target departments took the draft survey. Eleven of the responses were excluded, however, due to errors in the subjects' responses.

### **Determining the Reliability and Validity of the Scale**

Reliability and validity are the most important characteristics of any scale. The reliability and validity of the draft scale were confirmed using the data obtained from the 359 surveys completed by the teacher-candidates.

Reliability refers to the internal consistency of all the questions in a scaling tool, plus the scale's homogeneity and efficiency in assessing the concept in question. A number of methods have been developed for the purpose of determining the reliability of a scale. Among the most widely adopted of these is Cronbach's Alpha coefficient, a measure of the internal consistency of the items present in the scale. It is frequently used in determining the reliability of scales established by multiple choice questions and the total scores of tests (Alpar, 2003). Cronbach's Alpha coefficient takes into account all items in a given scale, is statistically consistent, and reflects the reliability of a scale (Özdamar, 2004). Therefore, it was used in this study as a measure of the reliability of the SAR.

Besides being reliable, a scale must also be valid (Auerbach, 2003). Validity refers to proper measurement of a given characteristic while not confusing it with any other characteristics (Tekin, 2000). The validity of the SAR was considered both in terms of content and structure.

Content validity is a subjective judgment of the quantity and quality of the items used in a scale to measure a characteristic (Büyüköztürk, 2005). The experience and opinions of researchers and authorities in the topic being measured need to be utilized in making this judgment (Baykul, 2000; Karasar, 2000; Tavşancıl, 2002). Opinions on the SAR survey were solicited from relevant authorities, with a consensus concluding that the SAR content was valid.

Structural validity is a mathematical assessment of a scale's determination of an abstract factor, such as a concept or dimension (Tavşancıl, 2002). Of several potential structural validity measurement methods, factor analysis was chosen to evaluate the SAR. Factor analysis is a multivariate statistical procedure which analyzes relationships between variables. It can be used to reduce the number of variables under consideration by demonstrating that two or more "variables" are in fact measures of the same thing (Nakip, 2003).

The results of the reliability test and factor analysis are discussed below.

### **Data Analysis**

Before subjecting the SAR data to factor analysis, the results of the initial survey items were analyzed to assess their individual relevance. The purpose was to determine which of the items in the survey were relevant and should be retained, and which were irrelevant and could be discarded (Baykul, 2000). The score of each item was individually correlated with the total survey score, and items with low correlation were excluded from the scale (Karasar, 2000).

Correlations were determined using Pearson's Product Moment Correlation Coefficient. Items showing a correlation of less than 0.30 were removed from the survey. The remaining data was subjected to factor analysis using the Varimax rotation technique in order to create a factor structure of the 56 questions included in the SAR scale. Items with factor loadings of less than 0.45 in absolute value were regarded as insignificant and were excluded, as were items showing a difference of 0.10 or more between two loadings (Büyüköztürk, 2005). Several rounds of analysis were performed to account for the planned five factors in the scale. Cronbach's Alpha internal consistency coefficient of each factor of the developed SAR and the total correlations of all items were then calculated.

## **RESULTS AND DISCUSSION**

In order for the SAR to have high reliability and validity, items were selected using an item analysis conducted based on the item-and-total score correlation for assessing the significance of each item to the scale. The findings obtained are given in Table 1.

Table 1. Item Analysis Results of SAR<sup>a</sup>

Item No	Item & Total Score Correlation	Item No	Item & Total Score Correlation	Item No	Item & Total Score Correlation
I1	<b>0.4159</b>	I21	<b>0.4785</b>	I41	<b>0.5669</b>
I2	0.2621	I22	<b>0.3715</b>	I42	<b>0.5165</b>
I3	<b>0.4133</b>	I23	<b>0.4114</b>	I43	<b>0.6155</b>
I4	<b>0.4791</b>	I24	<b>0.4661</b>	I44	<b>0.5407</b>
I5	<b>0.4745</b>	I25	<b>0.4288</b>	I45	<b>0.4922</b>
I6	<b>0.5186</b>	I26	0.2561	I46	<b>0.4962</b>
I7	<b>0.3426</b>	I27	<b>0.3386</b>	I47	<b>0.5852</b>
I8	<b>0.4500</b>	I28	<b>0.4884</b>	I48	<b>0.3392</b>
I9	<b>0.3712</b>	I29	<b>0.3680</b>	I49	<b>0.5183</b>
I10	<b>0.3734</b>	I30	<b>0.4519</b>	I50	<b>0.3777</b>
I11	<b>0.4473</b>	I31	<b>0.4877</b>	I51	<b>0.4577</b>
I12	<b>0.3164</b>	I32	0.2399	I52	<b>0.3416</b>
I13	<b>0.3282</b>	I33	<b>0.5303</b>	I53	<b>0.4206</b>
I14	<b>0.4064</b>	I34	<b>0.5789</b>	I54	0.2391
I15	<b>0.3912</b>	I35	<b>0.5595</b>	I55	<b>0.3391</b>
I16	<b>0.4180</b>	I36	<b>0.5392</b>	I56	<b>0.3501</b>
I17	<b>0.3762</b>	I37	<b>0.5645</b>	I57	<b>0.3570</b>
I18	<b>0.5085</b>	I38	<b>0.3912</b>	I58	<b>0.3993</b>
I19	<b>0.4585</b>	I39	<b>0.4410</b>	I59	<b>0.3617</b>
I20	<b>0.5612</b>	I40	<b>0.5155</b>	I60	<b>0.3897</b>

<sup>a</sup> Numbers in bold indicate correlations with  $p < 0.01$ .

After an examination of Table 1, it was determined that four items with an item-and-total score correlation lower than 0.30 (items I2, I26, I32 and I54) did not contribute significantly to the scaling of the attitude to be measured; therefore, they were excluded from the scale. Apart from these four items, all the other item-and-total score correlations were found to be significant at a level of 0.01. Cronbach's Alpha internal consistency coefficient of the scale for the 56 remaining items was calculated by checking the values of "the internal consistency coefficient of the scale after the item was deleted" for each item. Through this method, it was established that no items were present that would lower the reliability of the scale.

The suitability of the data for factor analysis was determined by utilizing the Kaiser-Meyer-Olkin (KMO) and Bartlett's tests. The KMO measure of sampling adequacy tests whether the partial correlations among variables are small. This measure should be greater than 0.50 for a satisfactory factor analysis to proceed. The KMO sampling adequacy benchmark is deemed to be ideal between 0.90–1.00, very good between 0.80–0.89, good between 0.70–0.79, moderate between 0.60–0.69, weak between 0.50–0.59, and unacceptable below 0.50 (Akgül, 2003). With the factor analysis conducted on the data obtained from the scale, the KMO measure was found to be more than adequate (0.908).

Bartlett's test of sphericity measures whether the correlation matrix is an identity matrix, which would indicate that the factor model is not appropriate (Akgül, 2003; Bayram, 2004; Büyüköztürk, 2005). Bartlett's coefficient, with its associated probability of less than 0.05 ( $\chi^2 = 7528.213$ ;  $p < 0.05$ ), was determined to be significant. This means that the correlation matrix is not an identity matrix.

The results of the KMO and Bartlett's tests indicated that a factor analysis could be performed on our data.

A scale used as a measuring tool is expected to measure a characteristic spanning over a single dimension. This principle is especially important in scaling attitudes and establishes that the items present in an attitude scale are inter-related. The fact that a scale has a single dimension implies that the items constituting the scale measure a single structure (Balci, 2005). The single-dimension characteristic of the SAR at the first stage was tested by a principal components analysis. The expectation that the factors in the scale were clear-cut and significant was analyzed by utilizing the orthogonal Varimax rotation technique.

The principal components analysis followed by the orthogonal Varimax method of rotation suggested the presence of 14 factors with eigenvalues greater than one. These 14 factors together explained 60.23% of the total variance. Because the number of factors concerning the scale was much higher than expected, we wanted to reduce the number of factors to a smaller number of components to more easily analyze the data. Büyüköztürk (2005) suggests that factors accounting for the 2/3 of the total variance calculated in the first step of an analysis provide a reasonable number of principal components. In this respect, it was determined from the analysis of the SAR data that the first five factors with high eigenvalues explained 40.42% of the total variance. This variance rate made it possible for the SAR to be assessed as single scale made up of five factors. This is also clearly shown by a scree plot constructed using the component numbers and the corresponding eigenvalues (see Figure 1).

The plot revealed a steep drop after the first factor. This may indicate that the scale is a single-dimension. On the other hand, examination of the scree plot also reveals a steep curve followed by a bend and then a line trend. The components in the steep curve appear to be the first five factors, which account for most of the total variability in the data (given by the eigenvalues). The remaining factors account for a very small proportion of the variability in the data and are likely to be unimportant. Therefore, we retained only the first five factors.

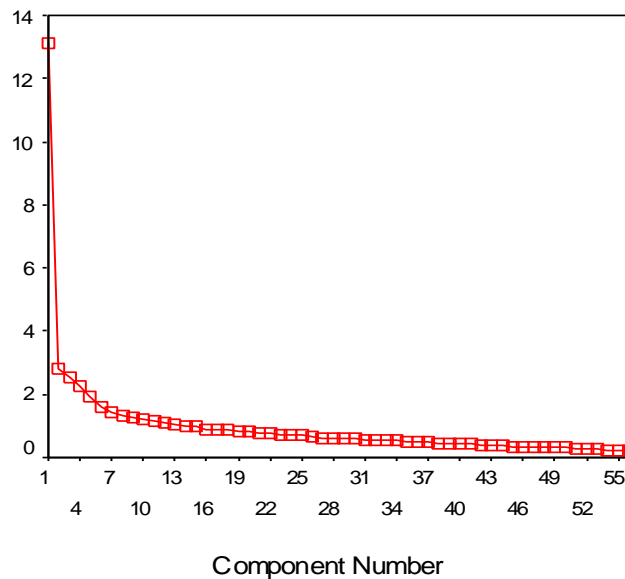


Figure 1. Scree plot of eigenvalues from principal component analysis.

The factors extracted from the analysis of the SAR data, along with their eigenvalues, the percent of variance attributable to each factor, and the cumulative variance of each factor and the previous factors are shown in Table 2. This indicates that the scale could be multi-dimensional. The first factor was clearly the most important, since by itself it accounted for 23.39% of the total SAR variance.

Table 2. *Principal component analysis of SAR data*

<i>Factor</i>	<i>Eigenvalue</i>	<i>% of Variance</i>	<i>Cumulative %</i>
1	13.100	23.390	23.390
2	2.810	5.017	28.408
3	2.514	4.490	32.897
4	2.265	4.045	36.943
5	1.945	3.473	40.416

Based on the analyses results presented in Figure 1 and Table 2, the data was reduced to five components, and the scale was determined to have five factors. Next, given that five factors were to be used, a factor analysis was conducted to understand what constructs underlay the data. A factor analysis with the Varimax rotation method was used to minimize the number of items that a high load on more than one factor. The loadings of the items on the five factors were extracted. The higher the absolute value of the factor loading, the more the factor contributes to the variable. Twenty-one items with factor loadings less than 0.45 in absolute value (items *I1, I6, I9, I12, I13, I14, I15, I16, I17, I18, I20, I24, I30, I33, I36, I38, I39, I48, I49, I56* and *I60*) and four items with a difference between the factor loadings with absolute value less than 0.1 (items *I34, I37, I42* and *I46*) were regarded as insignificant and removed from the scale. After removal of the weakly loading items, the revised scale, which now comprised 31 items, was divided into five factors. The distribution of these items into the factors, factor loadings and the Cronbach's Alpha values of the factors are presented in Table 3.

Table 3 shows that the developed SAR manifests a five-factor structure labeled F1 – F5. The factors were named by looking at the expressions of items accumulated in five components. All eight items (*I31, I35, I40, I41, I43, I44, I45, I47*) in the first factor, F1, had to do with the students' attitude towards the interest in research, and was called "the interest dimension." The second factor, F2, included six items (*I3, I4, I5, I7, I11, I15*) all reflecting the attitude towards the importance and necessity of research. This factor was labeled "the significance dimension." The third factor, F3, was named "the motivational dimension" because the seven items (*I19, I21, I23, I25, I27, I28, I29*) loaded on it reflected the attitude towards the motivation of research. Since the five items (*I49, I51, I53, I55, I57*) loaded on the fourth factor, F4, referred to the attitude towards the efficacy of the research, the factor was called "the efficacy dimension." The last factor, F5, comprised five items (*I10, I22, I50, I52, I58*) which referred to the attitude towards the concerns over research, and was labeled "the concern dimension." The descriptions of these items, which are included in the final version of the SAR, are presented in Appendix B.



Table 3. The distribution of items constituting SAR to five factors and factor loadings

Line No	Item No	Component				
		1	2	3	4	5
F1: INTEREST		$\alpha_1 = 0.856$				
1.	I31	0.681				
2.	I35	0.605				
3.	I40	0.588				
4.	I41	0.646				
5.	I43	0.621				
6.	I44	0.708				
7.	I45	0.686				
8.	I47	0.569				
F2: SIGNIFICANCE		$\alpha_2 = 0.809$				
9.	I3		0.618			
10.	I4		0.747			
11.	I5		0.697			
12.	I7		0.568			
13.	I11		0.716			
14.	I15		0.701			
F3: MOTIVATION		$\alpha_3 = 0.753$				
15.	I19			0.568		
16.	I21			0.506		
17.	I23			0.666		
18.	I25			0.649		
19.	I27			0.701		
20.	I28			0.533		
21.	I29			0.488		
F4: EFFICACY		$\alpha_4 = 0.750$				
22.	I49				0.522	
23.	I51				0.590	
24.	I53				0.597	
25.	I55				0.746	
26.	I57				0.743	
F5: CONCERN		$\alpha_5 = 0.646$				
27.	I10					0.595
28.	I22					0.679
29.	I50					0.595
30.	I52					0.507
31.	I58					0.562
<b>Cronbach's Alpha = 0.897</b>						

Depending on the alpha coefficient of a scale, its reliability is interpreted as follows: if  $0.00 \leq \alpha < 0.40$ , the scale is barely reliable; if  $0.40 \leq \alpha < 0.60$ , reliability of the scale is low; if  $0.60 \leq \alpha < 0.80$ , the scale is quite reliable; and if  $0.80 \leq \alpha \leq 1.00$ , the scale is highly reliable (Kalaycı et al., 2005). Cronbach's Alpha reliability coefficient of SAR was calculated as 0.897, demonstrating that the SAR is a highly reliable scale.

As reported in Table 3, Cronbach's Alpha values of the five factors of the scale are  $\alpha_1 = 0.856$ ,  $\alpha_2 = 0.809$ ,  $\alpha_3 = 0.753$ ,  $\alpha_4 = 0.750$ ,  $\alpha_5 = 0.646$ , respectively. This measure of internal consistency assesses how reliable multiple items are in measuring the same characteristic. Cronbach's Alpha value of each factor is 0.646 or higher, suggesting that the responses to items on each of the five factors were relatively high.

Next, a six-score series, including the total scale score, was utilized to investigate the relation of the five SAR factors to each other and to the total scale score. During the formulation of these score series, each single factor was regarded as a sub-scale, and the sub-scale scores obtained by adding the item scores, which constituted the factor. Pearson's Product Moment Correlation Coefficients were calculated in order to reveal the strength of relations between these score series. The results are shown in Table 4.

Table 4. *Correlation of the five factors of SAR with each other and total scale<sup>b</sup>*

	<i>Significance</i>	<i>Motivation</i>	<i>Efficacy</i>	<i>Concern</i>	<i>Total</i>
Interest	0.449	0.483	0.492	0.455	0.846
Significance	-	0.407	0.338	0.318	0.709
Motivation	-	-	0.338	0.312	0.713
Efficacy	-	-	-	0.306	0.654
Concern	-	-	-	-	0.641

<sup>b</sup>All correlations have  $p < 0.01$

Examination of these inter-correlations leads to the conclusion that there are positively high and significant correlations of the "interest," "significance," "motivation," "efficacy," and "concern" factors of the SAR. The correlations are both with each other and with the total scale score, which supports the structural validity of the SAR.

### CONCLUSION AND IMPLICATIONS

In this study, a five-point Likert-type SAR, which can be used to measure undergraduate education students' attitudes towards research, was developed, and findings concerning the reliability and validity of the scale presented. In the first stage of the analysis, item analysis was applied to the data from a 60 item draft scale. As a result, four items found to have insignificant contributions to measuring student attitudes toward research were excluded from the scale.

Results from factor analysis applied to the remaining 56 item SAR data indicated that the items with eigenvalues higher than 1 could be formulated under 14 factors. A close examination of analysis results revealed that the first five factors with high eigenvalues explained 2/3 of the total variance calculated in the first step of the analysis, and this finding enabled the scale to be assessed as a five-factor scale. As a result of the factor analysis and Varimax rotation technique applied on the SAR, 29 items were excluded from the scale. Thus, the final state of the SAR consisted of a total of 31 items, 9 of which had negative connotations and 22 had positive connotations (see Appendix B). These items were grouped under five factors: "interest," "significance," "motivation," "efficacy," and "concern." These factors explained 49.5% of the total variance. For the whole SAR, the internal consistency coefficient was 0.897, and for each sub-scale, it was found to be 0.856, 0.809, 0.753, 0.750 and 0.646, respectively.

Papanastasiou's ATR scale was made up of five factors: "research usefulness for profession," "research anxiety," "positive attitudes toward research," "relevance to life," and "research difficulty." These five factors were comprised of 32 items in a seven-point Likert-type scale. The sub-dimension numbers of the SAR and ATR scales are identical, and the sub-dimension names almost match. Because the content of items in the SAR is different, in addition to providing independent confirmation to Papanastasiou's work, the SAR adds variety to the literature.

Findings obtained via the implementation of the SAR in future studies will establish the positive and negative attitudes of students towards research. In addition, findings acquired by applying the SAR using different variables could enable better perceptions and assessments of the attitudes of university students towards research and would also allow precautions to be taken concerning the issue. In this respect, it is assumed that the addition of "Scientific Research Methods" and similar classes to the programs in education facilities beginning in the 2006–2007 academic year positively contributed to the attitudes of teacher-candidates towards research at Turkish universities.

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## APPENDICES

### Appendix A: 60 Item Draft Scale

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Strongly disagree					
2. Disagree					
3. Neither agree nor disagree					
4. Agree					
5. Strongly agree					
1. I like researching things that interest me.	[1]	[2]	[3]	[4]	[5]
2. I do not like to discuss research findings with others.	[1]	[2]	[3]	[4]	[5]
3. Research contributes to my life.	[1]	[2]	[3]	[4]	[5]
4. I believe that time spent for research is a total waste.	[1]	[2]	[3]	[4]	[5]
5. Research is useful for my career.	[1]	[2]	[3]	[4]	[5]
6. I am hostile toward research.	[1]	[2]	[3]	[4]	[5]
7. Research is indispensable in my professional life.	[1]	[2]	[3]	[4]	[5]
8. Learning things about research is a waste of time.	[1]	[2]	[3]	[4]	[5]
9. I am inclined to learn details of research.	[1]	[2]	[3]	[4]	[5]
10. Research is complicated.	[1]	[2]	[3]	[4]	[5]
11. Research helps to make efficient and determinative decisions.	[1]	[2]	[3]	[4]	[5]
12. Research requires tremendous amount of prior knowledge.	[1]	[2]	[3]	[4]	[5]
13. To understand research I try to connect it to daily life.	[1]	[2]	[3]	[4]	[5]
14. I do not think I can ever do research.	[1]	[2]	[3]	[4]	[5]
15. Research is valuable for every professional.	[1]	[2]	[3]	[4]	[5]
16. Research bores me.	[1]	[2]	[3]	[4]	[5]
17. Research results are useful in practice.	[1]	[2]	[3]	[4]	[5]
18. Research makes me nervous and confuses me.	[1]	[2]	[3]	[4]	[5]
19. Research gives me confidence.	[1]	[2]	[3]	[4]	[5]
20. Research courses scare me.	[1]	[2]	[3]	[4]	[5]

21. I like sharing my research results with friends.	[1]	[2]	[3]	[4]	[5]
22. Research is difficult.	[1]	[2]	[3]	[4]	[5]
23. I spend time correlating research results with underlying	[1]	[2]	[3]	[4]	[5]
24. I do not bother taking research related courses.	[1]	[2]	[3]	[4]	[5]
25. Research increases my professional motivation.	[1]	[2]	[3]	[4]	[5]
26. It is difficult to find tools needed for research.	[1]	[2]	[3]	[4]	[5]
27. Research decreases my career mistakes.	[1]	[2]	[3]	[4]	[5]
28. Research worries me.	[1]	[2]	[3]	[4]	[5]
29. I am quite confident when it comes to research.	[1]	[2]	[3]	[4]	[5]
30. Research results are no use to me.	[1]	[2]	[3]	[4]	[5]
31. I enjoy studying current research results.	[1]	[2]	[3]	[4]	[5]
32. Collecting data for research is a significant problem.	[1]	[2]	[3]	[4]	[5]
33. Research provides opportunities to improve knowledge.	[1]	[2]	[3]	[4]	[5]
34. I do not like spending time on research.	[1]	[2]	[3]	[4]	[5]
35. Research draws my attention.	[1]	[2]	[3]	[4]	[5]
36. I do not like following research.	[1]	[2]	[3]	[4]	[5]
37. I cannot think of life without research.	[1]	[2]	[3]	[4]	[5]
38. Reference research books are difficult to follow/understand.	[1]	[2]	[3]	[4]	[5]
39. Research improves professional productivity.	[1]	[2]	[3]	[4]	[5]
40. I do not find research problems interesting.	[1]	[2]	[3]	[4]	[5]
41. I like doing research.	[1]	[2]	[3]	[4]	[5]
42. I find it difficult to understand the research concepts.	[1]	[2]	[3]	[4]	[5]
43. Research boosts my career confidence.	[1]	[2]	[3]	[4]	[5]
44. I do not think research will produce any results.	[1]	[2]	[3]	[4]	[5]
45. I like topical research.	[1]	[2]	[3]	[4]	[5]
46. I do not spend much time studying research.	[1]	[2]	[3]	[4]	[5]
47. Research improves general knowledge.	[1]	[2]	[3]	[4]	[5]
48. Finding reference research books is difficult.	[1]	[2]	[3]	[4]	[5]
49. Research improves the personality.	[1]	[2]	[3]	[4]	[5]
50. I worry about not obtaining valid research results.	[1]	[2]	[3]	[4]	[5]
51. We can achieve new findings via research.	[1]	[2]	[3]	[4]	[5]
52. I do not have enough time for research.	[1]	[2]	[3]	[4]	[5]
53. Research is necessary for everyone.	[1]	[2]	[3]	[4]	[5]
54. Research produces results inapplicable to my daily life.	[1]	[2]	[3]	[4]	[5]
55. Research makes life more meaningful.	[1]	[2]	[3]	[4]	[5]
56. I do not have skills for research.	[1]	[2]	[3]	[4]	[5]
57. Research is very important.	[1]	[2]	[3]	[4]	[5]
58. I make many mistakes in research.	[1]	[2]	[3]	[4]	[5]
59. Research makes my life easier.	[1]	[2]	[3]	[4]	[5]
60. Research is stressful.	[1]	[2]	[3]	[4]	[5]

### Appendix B: Scale of Attitudes toward Research

3. Research contributes to my life.
4. I believe that time spent for research is a total waste.
5. Research is useful for my career.
7. Research is indispensable in my professional life.
10. Research is complicated.
11. Research helps to make efficient and determinative decisions.
15. Research is valuable for every professional.
19. Research gives me confidence.

21. I like sharing my research results with friends.
  22. Research is difficult.
  23. I spend time correlating research results with underlying principles.
  25. Research increases my professional motivation.
  27. Research decreases my career mistakes.
  28. Research worries me.
  29. I am quite confident when it comes to research.
  31. I enjoy studying current research results.
  35. I cannot think of life without research.
  40. I do not find research problems interesting.
  41. I like doing research.
  43. Research boosts my career confidence.
  44. I do not think research will produce any results.
  45. I like topical research.
  47. Research improves general knowledge.
  49. Research improves the personality.
  50. I worry about not obtaining valid research results.
  51. We can achieve new findings via research.
  52. I do not have enough time for research.
  53. Research is necessary for everyone.
  55. Research makes life more meaningful.
  57. Research is very important.
  58. I make many mistakes in research.
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## Öğretmen Adaylarının Araştırmaya Yönelik Tutumlarını Belirlemek İçin Bir Ölçek Geliştirme Çalışması

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### Giriş

Her bilim alanındaki gelişmeler yapılmış sistematik araştırmaların katkılarına bağlıdır. Araştırmaya çok farklı açılardan bakılabildiği gibi araştırmaya yönelik davranışlar da farklılıklar gösterebilir. Literatürde araştırmaya yönelik tutumlar ve bu tutumlardaki değişikliklere sebep olan faktörler konusunda çalışmalar mevcuttur. Papanastasiou (2005) araştırmaya yönelik tutumları analitik olarak ölçebilecek bir ölçek geliştirmiştir. Bu çalışmada Papanastasiou'nun geliştirdiği ölçek örnek alınarak Dicle Üniversitesi, Siirt Eğitim Fakültesi'nde öğrenim gören öğretmen adaylarının araştırmaya yönelik tutumlarını belirleme amaçlı bir ölçek geliştirilmiştir.

### Yöntem

Araştırmaya Yönelik Tutum Ölçeği'nin (ATÖ) geliştirilmesinde sırasıyla, ölçek maddelerini belirleme, taslak ölçeği hazırlama, ölçeği uygulama, güvenilirlik ve geçerliliği belirleme aşamaları izlenmiştir.

Ölçek maddelerinin belirlenmesinde, Papanastasiou (2005) tarafından geliştirilen ölçek maddelerinden yararlanıldığı gibi yeni çalışmanın evreni dikkate alınarak yeni maddeler ekleme amacıyla 70 öğretmen adayına araştırmaya yönelik duygu, düşünce ve davranışları ile ilgili yoruma açık şu 6 soru sorulmuştur: 1) Araştırmanın mesleki yaşamdaki yararlılığı ile ilgili düşünceleriniz nelerdir? 2) Araştırma konusunda olumsuz (kaygı, korku, endişe, ilgisizlik gibi) duygu ve düşünceleriniz var mı? 3) Araştırmaya yönelik olumlu (özgüven, sevgi, ilgi, istek gibi) duygu ve düşünceleriniz var mı? 4) Araştırmanın yaşamla ilgisi hakkında düşüncelerinizi yazınız. 5) Araştırma yaparken karşılaşılabileceğiniz zorlukları yazınız. 6) Araştırma ile ilgili duygu ve düşüncelerinizi bir kompozisyon şeklinde yazınız.

Bu sorulara verilen cevaplar dikkate alınarak ölçekte yer alabilecek ifadeler seçilmiştir. Böylece taslak olarak kullanılacak 30'u olumlu 30'u olumsuz özellik gösteren toplam 60 maddelik bir taslak ölçek hazırlanmıştır (bkz. Ek A). Ölçekteki ifadelerin sıralanmasında yönlendirici etki olmaması için olumlu ve olumsuz ifadelerin artarda gelmeyecek şekilde sıralanmasına dikkat edilmiştir. Ölçekteki kullanılan cevaplar ve puanları şöyledir: Hiç 1- Katılmıyorum; 2-Katılmıyorum; 3-Kararsızım; 4-Katılıyorum; 5-Tamamen Katılıyorum.

Güvenirlik ve geçerlik, bir ölçme aracında bulunması gereken en önemli özelliklerdendir. ATÖ'nün güvenilirliğini belirlemek için Cronbach's Alfa katsayısı hesaplanmıştır. ATÖ'nün geçerliğine hem kapsam hem de yapı açısından bakılmıştır. ATÖ'nün kapsam geçerliğinin belirlenmesinde, konu alanı ile ilgili uzman görüşlerinin alınması uygun ve yeterli sayılmıştır. Ölçeğin yapı geçerliği ise faktör analizi yöntemi ile incelenmiştir.

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## Bulgular

Ölçekteki her bir maddenin ölçme gücünü değerlendirebilmek için madde-toplam puan korelasyonuna dayalı madde analizi yapılmış, elde edilen bulgular Tablo 1'de sunulmuştur. Bu aşamada madde toplam korelasyonu 0.30'dan düşük olan dört maddenin ölçekle ölçülmek istenen tutumun ölçülmesine çok az katkıda bulunacakları düşünüldüğünden ölçekten çıkarılmaları uygun görülmüştür. Bu maddeler dışındaki tüm madde-toplam puan korelasyonları 0.01 düzeyinde anlamlı bulunmuştur. İkinci aşamada ise ATÖ'ye ilişkin veriler faktör analizine tabi tutulmuş ve Varimax dik döndürme tekniği uygulanmıştır. Bu çözümlemede faktör yük değerleri 0.45'in altında olan maddeler ile yüksek iki yük değeri arasındaki fark en az 0.10 olan maddeler (Büyüköztürk, 2005) ölçekten çıkarılmıştır. Ölçeğin amaçlanan beş faktörde toplanması sağlanıncaya kadar analizler tekrarlanmıştır. Daha sonra, 56 madde için ölçeğin Cronbach Alfa iç tutarlılık katsayısı hesaplanmış ve her bir madde için 'madde çıkarıldıktan sonra ölçeğin iç tutarlılık katsayısı' değerlerine bakılarak ölçeğin güvenilirliğini düşüren madde bulunmadığı görülmüştür.

Verilerin faktör analizi için uygunluğu Kaiser-Meyer-Olkin (KMO) ve Barlett testleri ile belirlenmiştir. Ölçeğe ilişkin verilere uygulanan faktör analizi ile, KMO katsayısı 0.908 ve Barlett katsayısı ( $\chi^2 = 7528.213$ ;  $p < 0.05$ ) anlamlı bulunmuştur. Elde edilen bu değerler verilerimize faktör analizinin uygulanabileceğini göstermiştir.

ATÖ'nün ilk aşamada tek boyutlu olup olmadığı temel bileşenler analizi ile test edilmiştir. Ölçekteki faktörlerin daha açık ve anlamlı olması beklentisi de Varimax dik döndürme tekniği uygulanarak incelenmiştir. Temel bileşenler analizi ve daha sonra yapılan Varimax dik döndürme çözümlemesinde, ölçekteki maddelerin özdeğeri 1'den büyük olan 14 faktör altında toplandığı görülmüştür. Bu 14 faktör ölçeğe ilişkin varyansın %60.23'ünü açıklamıştır. Ölçeğe ilişkin faktör sayısının beklenenden çok fazla olması nedeniyle bu sayının azaltılması düşünülmüştür. Büyüköztürk (2005)'e göre analize dahil değişkenlerle ilgili toplam varyansın 2/3'ü kadar miktarının ilk olarak kapsandığı faktör önemli faktör sayısı olarak değerlendirilir. Bu doğrultuda, ATÖ'nün faktörleri incelendiğinde, özdeğeri yüksek olan ilk beş faktörün ölçeğe ilişkin toplam varyansın %40.42'sini açıkladığı belirlenmiştir. Bu varyans oranı ATÖ'nün beş faktörden oluşan bir ölçek olarak değerlendirilmesine olanak sağlamıştır.

Dikey ekseninde özdeğerlerin yatay ekseninde ise faktörlerin gösterildiği Şekil 1'deki Scree Sınaması incelendiğinde, birinci faktörden sonra yüksek ivmeli bir düşüş gözlenmektedir. Bu durum, ölçeğin tek boyutlu olabileceğini göstermektedir. Öte yandan, beşinci faktörden sonra eğrinin aynı doğrultuda ilerlediği, yani bundan sonraki faktörlerin getirdikleri ek varyansların katkılarının çok düşük ve birbirine yakın olduğu görülmektedir. Böylece yüksek ivmeli hızlı düşüşlerin olduğu optimal faktör sayısının beş olmasına karar verilmiştir. Belirlenen beş faktöre ilişkin özdeğerler, varyans yüzdeleri ve toplam varyans yüzdeleri Tablo 2'de gösterilmiştir.

Şekil 1 ve Tablo 2'deki açıklamalar doğrultusunda, ölçeğin beş faktörlü olabileceği düşünülmüştür. Daha sonra verilere tekrar uygulanan faktör analizinde faktör sayısı beş olarak kodlanmıştır. Yapılan çözümlemeler doğrultusunda, faktör yük değeri 0.45'in altında olan 21 madde ile yük değerleri arasındaki fark 0.1'den az olan 4 madde ölçekten çıkarılmıştır. ATÖ'ni oluşturan 31 maddenin beş faktördeki dağılımı, faktör yükleri ve faktörlerin Cronbach Alfa değerleri Tablo 3'de gösterilmiştir. Tabloda görüldüğü gibi ATÖ beş faktörlü bir yapı göstermektedir ve Cronbach Alfa güvenilirlik katsayısı 0.897 ölçeğin yüksek derecede güvenilir



bir ölçek olduğunu göstermektedir. Ölçeğin alt faktörlerinin Cronbach Alfa değerleri sırasıyla  $\alpha_1=0.856$ ,  $\alpha_2=0.809$ ,  $\alpha_3=0.753$ ,  $\alpha_4=0.750$ ,  $\alpha_5=0.646$ 'dır.

Beş bileşende toplanan maddelerin ifadelerine bakılarak alt faktörler sırasıyla ilgi, önem, motivasyon, yararlılık ve kaygı boyutu olarak adlandırılmıştır. ATÖ'nün alt faktörlerinin birbiriyle ve toplam ölçek puanıyla ilişkisi incelenirken biri toplam ölçek puanı olmak üzere altı puan dizisi kullanılmıştır. Bu puan dizileri oluşturulurken her bir faktör bir alt ölçek kabul edilmiş, faktörü oluşturan madde puanları toplanarak alt ölçek puanları elde edilmiştir. Bu puan dizileri arasındaki ilişkileri ortaya çıkarmak için Pearson momentler çarpım korelasyon katsayıları hesaplanmıştır. Tablo 4'te verilen bu sonuçlar incelendiğinde, ilgi, önem, motivasyon, yararlılık ve kaygı faktörlerinin birbirleriyle ve toplam ölçek puanıyla gösterdiği pozitif düzeyde yüksek ve anlamlı korelasyonlar, ATÖ'nün yapı geçerliğini desteklemektedir.

Bundan sonra yapılacak çalışmalarda, ATÖ'nün uygulanmasıyla elde edilecek bulgular, öğrencilerin araştırmaya yönelik olumlu/olumsuz tutumlarının belirlenmesini sağlayacaktır. Ayrıca ATÖ'nün farklı değişkenler ile birlikte uygulanmasından elde edilecek bulgular üniversitemizdeki öğrencilerin araştırmaya yönelik tutumlarının daha iyi algılanarak değerlendirilmesi ve bu konuda önlemlerin alınmasını sağlayabilecektir. Bu doğrultuda, eğitim fakültelerinin öğretim programlarında "Bilimsel Araştırma Yöntemleri" ve buna benzer derslerin konulması öğretmen adaylarının araştırmaya yönelik tutumlarına olumlu yönde katkıda bulunacağı beklenebilir.

*Anahtar Kelimeler:* Öğretmen Adayları, Araştırmaya Yönelik Tutum, Ölçek Geliştirme

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