



## RESEARCH ARTICLE

### ATTITUDE SCALE OF STATISTICS, DEVELOPMENT, RELIABILITY AND VALIDITY STUDIES

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#### ABSTRACT

In this research, it has been aimed to develop a measurement tool that can determine the teacher candidates' attitudes toward statistics. Study group of the research has consisted of 401 teacher candidates. In the study, item analysis based on correlation and exploratory factor analysis methods have been used and Cronbach's alpha coefficient has been calculated. In the analysis of item analysis based on correlation made on 50 items formed during the development of the scale, non-significant items have been removed from the scale. Exploratory factor analysis has been performed for remaining 41 items to determine the construct validity of the scale. As a result of this analysis a 28-item scale describing three factors (value, relevance and difficulty) and the 42.428% of the variance has been obtained. According to the results of the analysis it can be said that this scale developed is valid and reliable.

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## INTRODUCTION

There are several meanings of the "statistics" word. Statistics is a science of data collection, processing the data obtained, interpretation and analysis methods and techniques for specific purposes (Serper, 2010: 3). The data which we have obtained by pondering, measuring, counting or bringing together with specific groups and showing them by the numbers are a part of our lives. If data come into question, science of statistics comes to mind. Statistics processing, summarizing, collecting the data and obtaining the general information about the public is a discipline (Özdamar, 2003: 7). This discipline is a concept used in different meanings and as a result of that, had different definitions. It is a science concerned with collecting, summarizing, presenting, editing analyzing and interpreting the statistical data and the results obtained from these analyses and reaching a decision (Başar and Oktay, 2009). By a similar approach, it is said that the science of statistics is a discipline including the principles of obtaining data for a specific purpose, summarizing by tables, figures and charts, interpreting the results obtained and describing the confidence level of the results, generalizing the results obtained from the data to the population, researching the relationship between the dependent

variables, making future estimates of different topics, creating the experiment and observing (Ardıç, Yılmaz and Demir, 2012). Thus, statistics is the one of the basic tools of scientific methods that allow to collect, classify, analyze, present and interpret them for certain purposes and to transfer them to audiences. In short, statistical data is the science of the explanation or the language of the science.

To make decisions is an important part of our lives and we use the statistics in decisions which we adopt throughout our lives without noticing. We decide based on knowledge, values and attitudes within us. In analyzing the resulting data groups, when we face up with ambiguous situations, the statistics helping us in making decision and being the most important tool of the scientific studies is in relationship with other disciplines and makes important contributions in many areas by putting the theory based on mathematic into practice. Today, the importance of the statistical science increases day by day in terms of individuals, societies, organizations and scientific research conducted, and statistical science is often referred to many areas especially in natural sciences such as in medicine, biology, agriculture, meteorology and engineering. Especially in researches in the field of social sciences, the statistical science has more special place than the others. Especially in the researches in the field of many sciences including in social sciences, obtaining reliable and valid results is not possible

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without reference to statistics (Karagöz and Ekici, 2004). Individual can learn a lot of things by seeing and hearing, but he/she cannot deeply fathom some of the highlights. In this situation, statistics can provide clear information that is needed. For example, the statistics can be seen as a need for the regulation of the family budget, the measurement of the body weight, body temperature, pulse and blood pressure in case of illness, taking the necessary measures time to time and seeing the results of them. In fact, these are not something else other than answering the questions which individuals meet during their daily lives such as "How much?," "When?," "Where?," "How?," "How many?" by using numerical expressions. Thus, statistics helps individual to understand what happens around him/her and tell others about them. On the other hand, the price statistics that gives an idea of the cost of living and the statistics that show diseases and deaths, traffic accidents, those who died and injured in this accident, and the election results, the public opinion surveys on political and social problems and their results are watched with great interest by a vast majority of public (Serper, 2010: 13).

Statistics takes place in almost all education steps from the elementary school to the university and it is also taught as a course. For example, the students who are taking education in other programs such as mathematics, science, and social studies of the faculties of education training teacher take statistics course. University students who are taking this course gain to practically teach the basic concepts, counting rules, methods of data collection and analysis about statistics increasingly including in curriculum to their students, when they become teacher. In literature, it is observed that a large number of definitions are made about attitude. The attitude is an emotional, behavioral and mental response trend organized based on information, experience, feelings and motives (motivation) against to person or any social issue, event or object around itself (İnceoğlu, 2010). It is said that the attitude is a significant factor in determination of the behavior and forms the base of describing our thoughts, ideas and reactions about other people, ideas and situations (Bordens and Horowitz, 2002: 177). The attitudes have three forming elements, including emotional, behavioral and cognitive and these elements are generally considered to be the organization, and therefore to be the internal consistency. There is an important aspect of every attitude. A positive or negative response tendency is concerned against to the subject of attitude. If the attitude is positive, positive evaluation, tendencies and emotions are concerned against to event, person or object, if the attitude is negative, negative evaluations, tendencies and emotions are concerned (İnceoğlu, 2010).

Since Wise and Auzmedi's seminal studies measuring the attitudes in affective and cognitive aspects, researches made on statistics have gained a great importance and interest (Santillan, Garcia, Castro, Abdala and Trejo, 2012). The attitude towards the statistics is generally described as the tendency of responding positively or negatively to objects, situations or people related to learning a multi-dimensional concept and statistics (Gal, Ginsburg and Schau, 1997; Schau, 2003). Such that, the attitude towards statistics consists of affective (emotions and motivation level about courses and exams) and cognitive (knowledge and beliefs about the ability searched for

learning statistics and relevant discipline) and behavioral (action/ mobility trend in course work and exam performance) (Chiesi and Primi, 2009; Schau, Stevens, Dauphinee and Del Vecchio, 1995). Development of positive attitude against a course includes the behaviors such as demand of attending the lesson, satisfaction from responding, accepting to have a value, and being in favor of the adoption as a value (Özçelik, 1998). In educational activities, the attitudes of students towards the course are the factors that affect their motivation, learning speed and success. Attitudes may be positive or negative. Positive attitudes toward statistics increase the motivation of individuals, provide faster learning and contribute to be successful. Therefore, it is important that the attitudes toward statistics are developed in positive manner and protected. If effective and meaningful learning cannot be provided in statistics courses, negative attitudes toward statistics occur and therefore, the motivation of student decreases, their learning processes are delayed and their success decrease. Therefore, the determination of students' attitudes toward statistics is important.

For the determination of attitudes toward statistics, measuring means are needed. The Likert scale is mostly used one among them. The first "Statistics Attitude Scale" aiming to measure the attitudes toward statistics and in the literature has been developed by Robert and Bilderback by benefiting from the attitude towards mathematics scale that had been developed by Dutton. This scale is a one-dimensional scale consisting of 33 items in 5 point Likert-type (Estrada, Batanero and Lancaster, 2011). Then other researchers have developed scales that have almost been similar but shown differences on the manner of material and sub-factors. Schau, Stevens, Dauphinee and Del Vecchio (1995) have developed a "Statistical Attitude Scale" consisting of 28 items in 7 point Likert-type with four sub-factors (effect, cognitive components, difficulty and value). After that Schau (2003) has developed another scale consisting of 32 items in 7 point Likert-type with six sub-factors (effect, cognitive components, difficulty, value, interest, effort sub-factor) by adding four items to this scale.

In the last 20 years in our country, different statistical attitude scales in Likert type have been developed. Köklü (1994) has developed scale consisting of 28 items with single factor, Aksu and Bikos (2002) have developed the three-factor scale consisting of 24 items (beliefs about the benefit of the area, and affective dimension, commitment to the area), Diri (2007) has developed a three-sub factor scale consisting of 34 items (fear and reliance, professional and importance, love, pleasure and interest dimensions of statistics), Ellez, Gümüş and Seferov (2009) has developed a four-sub factor scale consisting of 32 items (participation, effort, maintaining to study sub-factors and willingness to work, Yaşar (2014) has developed a five-factor scale consisting of 33 items Statistics fear-anxiety, relationship with the professional experience and the statistics, the importance of statistics, difficulty of the statistics perceived enjoyment statistics.

Attitude towards the science of statistics is related to seeing it as a method ensuring the large data sets of statistical science to arrange and interpret. Statistics provides making future estimates in different issues, presenting and interpreting them

and finally ensuring the results to reach the large masses. The one of the said groups are university students. The attitude towards statistics improves academic achievement. From this point, the aim of the research is to develop a "Statistics Attitude Scale (ITO)" that will determine the university students' attitudes towards statistics and will be reliable and valid.

## MATERIALS AND METHODS

Survey Research includes the questions created based on a problem and the answers given for them. Therefore, our research is a survey research.

### Study Group

Study group of the research are 401 teacher candidates who have taken education in Elementary Mathematics Education of The Faculty of Education in Siirt University and Dicle University in the fall semester of 2009-2010 academic year and have taken the course of Probability and Statistics. Since it has been thought to be reached to all students in study group, Sampling has not been used. According to the data obtained from the form of scale, 115 students (28,7%) continue to take education in Elementary Mathematics Education of The Faculty of Education in Siirt University, 286 students (71,3 %) continue to take education in the same faculty in Dicle University. 118 students (29,4%) are women and 283 students (70,6%) are men.

### Process

#### Development of Data Collection Tool

To collect data in the study, ITO draft scale form has been used with personal information form. During forming draft scale, the stages of (a) formation of scale items, (b) reference to expert opinion, (c) the pre-test, (d) validity and reliability studies used in the development of measuring instruments mentioned in the studies in the literature have been followed.

**a) Formation of scale items:** It has been benefited from similar scales in the literature and students' views in formation of scale items. Some open-ended questions such as (1) What is the Statistics, what do you know about the statistics? (2) What are your thoughts on the importance of statistics in education? (3) Explain the benefits of statistics in professional life, have been asked to 42 students who have taken the course of Probability and Statistics and their views have been taken in order to form the item pool. At this stage, the expressions that can be the attitude sentence have been systematically selected and 60 attitude sentences (32 positive 28 negative items) including cognitive, affective and behavioral expressions that will be able to take place in the scale as a result of the examination of other scales in the literature.

**b) Reference to expert opinion:** Draft scale has been presented to 6 academics expert in the field of Measurement and Evaluation, Statistics and Turkish Language. It has been asked to academics to mark the one of the options as "Completely Measure", "Partially Measure", and "Not Measure" for the scale items. In this process 54 items which at

least three academics have marked as "Completely Measure" have been included in the scale.

**c) Pre-test:** At this stage, 54-item scale has been applied to 55 students who did not take place in study group in order to determine the response time and comprehensibility. At the end of the application, four items that could not be understood by the students have been removed from the scale. Thus, 50-item scale (27 positive, 23 negative) has been finalized. During the following process, draft scale has been applied to the students in the study and the analyses have been conducted in accordance with the scale scores.

**d) Validity and reliability study:** Reliability and validity are one of the most important features to be included in a measuring tool. In this context, the draft scale has been applied to 409 teacher candidates in the study. During scoring of application results, Positive items in the scale have been scored as "totally agree = 5", "agree = 4", "undecided = 3", "disagree = 2," "strongly disagree = 1" from 1 to 5, and the scores have been also reversed in the negative items. Therefore, the highest score to be taken from the scale is 250, the lowest score is 50. In the scoring phase, 8 scales that had been identified to be marked as incomplete and incorrect have been excluded. Reliability and validity of the scale have been determined by using the data obtained from 401 measuring tools that had been considered valid.

**Reliability** is a concept demonstrating to measure the homogeneity and qualification of the formation discussed and the consistency of all questions with each other in a measuring tool. Many methods have been developed to determine the reliability of the scale. The most commonly used one of them is Cronbach's alpha coefficient. This coefficient is the best coefficient reflecting the test structure of overall reliability compared to other coefficients, because it calculates statistical basis consistently by taking into account all the questions (Özdamar, 2004: 622). Cronbach's alpha coefficient is a measure of the internal consistency of the items on the scale. It is commonly used in the determination of reliability of scales based on multiple choice and total scores (Alpar, 2003: 380). Therefore, Cronbach's alpha coefficient has been calculated in order to determine the reliability of ITO. The scale must be not only reliable, but also valid in order to be more objective (Auerbach, 2003: 79).

**Validity** is an important component for effective research. If a research is invalid, then it is worthless. Therefore, validity is a requirement for both quantitative and qualitative researches (Cohen, Manion and Morrison, 2005: 106). Test of the content validity and the construct validity that are mostly preferred have been performed for the validity of ITO. **Content validity** is an indication that items in the measuring tool are sufficient both quantitatively and qualitatively in the measurement of the features that is wanted to be measured, or not. (Büyüköztürk, 2009: 167). It requires the co-operation with expert in this field and it is determined through consultation with the experts (Baykul, 2010:226; Tavşancıl, 2010: 40). In determination of content validity of ITO, taking relevant expert's views has been considered as appropriate and adequate. Also, **construct validity** allows what the results are in connection with. Namely,

it shows how an abstract phenomenon (concept, dimension, etc.) can be measured accurately. (Tavşancıl, 2010: 45). ITO's construct validity, namely the measurability of single construct has been examined by factor analysis method. Factor analysis is one of the multivariate statistical methods, which allow data to be presented more expressively and briefly based on the relationship between a group of variables. These method examines the relationships between variables, helps them to be converted into a smaller number of variables (Nakip, 2003: 403).

### Analysis of Data

In analysis of data related to the scale, SPSS 15.0 packaged software has been used. At the first stage, item analysis has been applied to the data obtained from the scale applied to 401 teacher candidate in order to examine the contribution of the items to the scale and to determine the items that have not been well-functioning. Item analysis is made to be used in item selection studies for obtaining information. In other words, item analysis is made in order to calculate the item statistics, select the items that can be put in the test directly, determine the items that can be put in the test by correcting them, and to determine what would be the direction of correction studies on these items and extract the items that are improper for adding the test (Baykul, 2010: 370). In the item analysis, reliability of scale items is examined by looking at the correlations between each item score and total score taken from the test and it is decided to be removed the items which their correlation coefficients are low (Karasar, 2000: 150). In the study, total item test correlations related to the items of the scales have been found by calculating the Pearson product-moment correlation coefficient. At this stage, items which item-total correlation is lower than 0,30 have been removed from the scale. At the second stage, data related to ITO has been subjected to factor analysis, principal component analysis has been selected and varimax rotation technique has been applied. In this analysis, items which factor load values were lower than 0,45 and items which were difference between the two highest load value was at least 0,10 have been removed from the scale (Büyüköztürk, 2009: 124)

## RESULTS

In the item analysis applied at the first stage to identify what items should be selected, as the reliability and validity of the scale has been high, item analysis based on item total score correlation has been performed in order to evaluate the each item's measurability, and results obtained have been presented in Table 1. When Table 1 is examined, it has been concluded that 9 items (M6, M8, M10, M14, M18, M24, M26, M27, M48) which were the item-total score correlation value was lower than 0,30 contribute in a very slight degree in measurement of attitude expression demanded to be measured and it has been decided them to be removed from the scale. Item total correlation of other items has been significant of 0,01 level. For the remaining 41 items Cronbach alpha reliability coefficient has been calculated. For each item, it has been determined that the item which decreased the reliability value of the scale could not be found by looking at "internal consistency coefficient of the scale after deleting the item".

Then, eligibility of data structure for Factor Analysis has been analyzed by Kaiser-Meyer-Olkin (KMO) and Barlett globality test. KMO value has been 0,922 and Barlett globality test ( $\chi^2=6180,320$ ;  $p<0,01$ ) data has been significant. KMO value calculated has said that data structure has been perfect for making factor analysis (Tavşancıl, 2010: 50) and chi-square value obtained as a result of Barlett test ( $\chi^2$ ) to be significant has showed that data had arisen from normal distribution. Results shows that factor analysis can be applied on data. In the first factor analysis made without putting a limit on the number of factors of scale data, it has been determined that the eigenvalues of each item in the scale has been greater than 1 and collected in 8 different factors and the factors has been explained 54.747% of scale variance. Due to the high number of factors, it has been decided to reduce. According to Büyüköztürk (2009), the factor that 2/3 of total variance about the variables has been covered is described as a number of important factors. From this point, First three factors have been calculated to describe 39.539% of total variance of the scale, when the factor values of ITO have been considered. This variance value shows that ITO can be a three-factor scale. When developing a scale, another method used in determination of the number of factors should be able to support the assessment made in examination of Scree-Plot Graphic obtained in Figure 1.

When Figure 1 is examined, components on Y axis shows a descent to X axis and this downward trend is shown by dots in the context of their contribution to the variance. Each interval between the two dots represents a factor. On the other hand, it is seen that curve is in the same direction after third factor, namely the contributions of additional variances brought by next factor are both small and close together. In this process, it has been decided that optimal number of factors which had rapid descent with a high velocity has been three. Eigenvalues of three factors determined for the scale, variance percentages and total variance percentages has been shown in Table 2. In accordance with the descriptions in Figure 1 and Table 2, it has been thought that the scale has been a three-factor scale. After this period, the number of factor has been coded as three, and varimax rotation method has been preferred due to frequency of use, ease of interpretation and ease of use. As a result of analyses related to ITO, 8 items which factor load value were calculated under 0,45 (M7, M13, M16, M28, M31, M32, M47, M50) and 5 items which the difference between factor load values was calculated under 0,1 (M11, M12, M17, M38, M45) have been removed from the scale. Eventually, the distribution of 28 items creating ITO obtained in three factors, factor loads and Cronbach alpha coefficient of the factors have been shown in Table 3. When Table 3 is examined, it is seen that ITO scale developed consists of three- sub factor. 1<sup>st</sup> factor consists of 12 items, 2<sup>nd</sup> factor consists of 8 items and 3<sup>rd</sup> factor consists of 8 items. Cronbach alpha coefficient of each sub-factor is respectively  $F\alpha_1=0,836$ ,  $F\alpha_2=0,841$  and  $F\alpha_3=0,792$ . Total variance rate explained by the scale is 42,428 and Cronbach alpha coefficient is 0,897. This value shows that ITO is a highly reliable scale. Besides, item total correlation of F1 factor changes between the values of 0,389 and 0,616, item total correlation of F2 factor changes between the values of 0,445 and 0,662, and finally item total correlation of F3 factor changes between the values of 0,425 and 0,585.

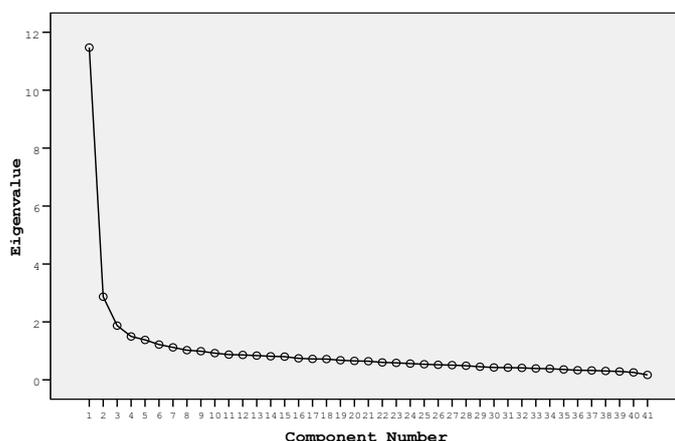


Figure 1. Scree-Plot Graphic

Table 1. Item Analysis Results Related to ITO

Item	MTPK	Item	MTPK	Item	MTPK	Item	MTPK	Item	MTPK
M1	,602*	M11	,598*	M21	,521*	M31	,502*	M41	,591*
M2	,610*	M12	,549*	M22	,521*	M32	,434*	M42	,525*
M3	,454*	M13	,441*	M23	,448*	M33	,460*	M43	,374*
M4	,369*	M14	,114	M24	,300	M34	,419*	M44	,527*
M5	,398*	M15	,491*	M25	,453*	M35	,450*	M45	,549*
M6	,291	M16	,391*	M26	,223	M36	,482*	M46	,513*
M7	,548*	M17	,586*	M27	,139	M37	,390*	M47	,310*
M8	,120	M18	-,563	M28	,549*	M38	,674*	M48	,247
M9	,408*	M19	,554*	M29	,482*	M39	,363*	M49	,456*
M10	,058	M20	,501*	M30	,455*	M40	,404*	M50	,399*

\*p<0,01; MTPK: Item total score correlations

Table 2. Results of Three Factors Obtained from ITO as a Result of Factor Analysis

Factor	Eigenvalue	Variance Percentage (%)	Total Variance Percentage
1	11,471	27,977	27,977
2	2,869	6,996	34,974
3	1,872	4,565	39,539

Table 3. Distribution of ITO items to Factors, Factor Loads and Item Analysis Results

Factor	No	Item	Factor Loads			MTK*
			F 1	F2	F3	
Factor 1: Value (α=0,836)	M25	Statistics rationalizes the numerical information	0,695			0,581
	M34	Statistics suggests different methods of data collection.	0,680			0,539
	M30	Statistics course improves the numerical thinking skills.	0,634			0,530
	M44	Statistics improves the ability to analyze events.	0,633			0,616
	M39	Statistics is learned by making research.	0,561			0,444
	M37	Statistics is a field of applied mathematics.	0,552			0,469
	M15	Statistics makes data significant by evaluating.	0,543			0,511
	M20	Statistics allows individual to be more productive in its field.	0,515			0,521
	M22	Statistics improves the ability to comment.	0,509			0,517
	M40	There is no importance of people's mathematical knowledge in statistics.	0,485			0,389
	M21	Learning something about statistics is a waste of time.	0,482			0,479
	M43	The use of computer software's (Statistica, SPSS, Minitap, etc.) facilitates the education of statistics.	0,469			0,394
		<b>Variance explained %</b>		<b>15,47</b>		
Factor 2: Interest (α=0,841)	M42	I use statistics in every area of my life.		0,726		0,614
	M2	I like to take the course of statistics.		0,684		0,662
	M46	Statistics is the indispensable part of human life.		0,668		0,573
	M1	I love statistics.		0,662		0,644
	M41	Dealing with unfinished solution of problems gives me pleasure in the course.		0,636		0,613
	M29	I would like to make an academic career in the field of statistics.		0,635		0,542
	M19	Statistics makes easier to take decisions for the future.		0,527		0,504
M23	I don't like to talk about statistics with others.		0,504		0,445	
	<b>Variance explained %</b>		<b>14,29</b>			
Factor 3: Zorluk(α=0,792)	M4	Statistics course is difficult to understand.			0,756	0,585
	M49	It is difficult to understand statistics formulas.			0,654	0,543
	M33	It is difficult to understand the analysis of statistics.			0,624	0,519
	M3	I'm afraid to statistics.			0,619	0,529
	M9	I have difficulty in understanding the general concepts related to statistics.			0,613	0,484
	M35	I don't trust myself when I have to solve statistics problems.			0,584	0,471
	M5	I have stress in the statistics course.			0,533	0,425
M36	I don't find textbooks on statistics understandable			0,490	0,444	
	<b>Variance explained %</b>			<b>12,650</b>		
<b>Total variance explained %</b>						<b>42,428</b>
<b>Cronbach alpha</b>						<b>0,897</b>

\*Item Total Correlation

**Table 4. Correlations of Factors Creating the Scale with each other and Total Scale**

Factors	Interest (F2)	Difficulty (F3)	Total scale score
Value (F1)	0,555**	0,370**	0,811**
Interest(F2)	-	0,496**	0,843**
Difficulty (F3)	-	-	0,759**

\*\*p&lt;0,01

Items included in F1 factor have been named as dimension of "VALUE", because it reflected the benefits due to ease of use and importance of statistics in personal and professional life; items included in F2 factor have been named as dimension of "INTEREST", because it reflected the attitudes due to personal interest levels for statistics and items included in F3 factor have been named as dimension of "DIFFICULTY", because it reflected the attitudes due to difficulty of statistics as a course.

Four-score series which one of them has been total scale point has been used, when the relationship of ITO's sub-factors has been examined with each other and with total scale score. While these set of scores has been created, each factor has been considered as a sub-scale, and sub-scale scores have been obtained by collecting the item scores creating the factor. To determine the relationship between these set of scores, Pearson product-moment correlation coefficient has been calculated. Results obtained are given in Table 4.

According to Table 4, the positive significant correlation coefficient of "value", "interest" and "difficulty" sub factors of ITO (p<0,01) that had been shown with each other and total scale score show that the scale developed measures the features wanted to be measured.

## RESULTS AND DISCUSSION

In this study, a 5-grade Likert-type ITO has been developed that will can be evaluated the teacher candidates' attitudes towards statistics and findings have been presented related to the reliability and validity of the scale. In the processes of forming the scale items used during the development of measuring tool and reference to the experts' views, a draft scale consisting of 50 items has been created by removing 10 items from the first scale consisting of 60 items. During the following process, 9 items that have been thought that they did not contribute enough in measuring the attitude demanded to be measured have been removed from the scale as a result of item analysis applied to the data related to the draft scale. In the next process, it has been determined that the eigen values of each item in the scale has been greater than 1 and collected in 8 different factors and the factors has been explained 54.747% of scale variance. Due to the high number of factors, it has been decided to reduce the number of factors. When the factor values of the scale have been considered, it has been determined that 2/3 of total variance of the first three-factor which had had the highest eigen value have been explained and it has been decided that the scale should be a three-factor scale. After that, As a result of factor analyses applied to ITO and varimax rotation technique, 8 items which factor load value were calculated under 0,45 and 5 items which the difference between factor load values was calculated under 0,1 have been

removed from the scale. Finally, total of 22 items has been removed from the scale as a result of analyses made in draft scale that 50 items had been originally included. In this research, total of 28 items, including negative 10 items and positive 18 items take place in ITO and it consists of three sub-factor called as "value", "interest", and "difficulty". It is shown that items in the scale have been consisted of consistent items with each other, because the Cronbach alpha value of ITO has been calculated as 0,897. In literature review, some of the statistics attitude scales developed are similar to ITO developed in this research with regard to the number of items (Köklü, 1994; Schau, Stevents, Dauphinee and Del Vecchio, 1995), with regard to the number of factors (Aksu and Bikos, 2002). Other scales developed in the literature are almost similar to ITO (Schau, 2003; Diri, 2007; Ellez, Gümüş and Seferov, 2009), but some differences are seen with the regard to the number of items and factors.

Data obtained in this study will be more effective in terms of apply the scale on the data collected from different samples in terms of validity and reliability analyses, because data obtained from this study is only limited to the students in the Faculty of Education, in Siirt University, and its contribution to the literature cannot be denied. Development of such a scale will enrich the studies evaluated with the other variables considered that to be related to the statistics (gender, experience, motivation, academic achievement, self-efficacy, math attitude, study attitude etc.) as different from the field of scale development to be conducted by the researchers. Thus, it will be ensured that the statistics attitudes of individuals can be evaluated by detecting better.

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