Teachers' Attitudes toward Information and CommunicationTechnologies Scale: Adaptation Study to Turkish

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Abstract

This study aims to adapt the scale developed by Albirini (2006) regarding teachers' attitudes towards Information and Communication Technologies into Turkish. Since the linguistic equivalence of scale adaptation studies should be ensured before starting the reliability and validity studies, the original scale was translated into Turkish by the researchers, and the stages of translation, evaluation of translations, expert opinion, back translation, evaluation of the translation and expert opinion were applied by six different experts. The final version of the scale was discussed with Turkish teachers' experts for a culturally acceptable translation to Turkish. The English teachers who work in the Sarıyer district of Istanbul were applied, the original English form and the Turkish translation of the scale at different times to provide data on the linguistic equivalence of the scale. After the linguistic equivalence was achieved, the descriptive method was used for the validity and reliability studies of the adaptation scale, and the participants were selected by a convenient sampling method. The participants in the research consist of 150 teachers from different disciplines who work in primary, secondary, and high schools in the Sarıyer district of Istanbul in the 2020-2021 academic year. Explanatory factor analysis, t-test, correlation, and Cronbach's alpha coefficient were calculated to measure validity. Confirmatory factor analysis was performed to ensure the construct validity of the scale. Since Cronbach's alpha coefficient was calculated as α = 891 and is higher than 0.7, the adaptation of the TAICT scale into Turkish can be considered reliable. It is expected that this Turkish adaptation study will be used as a tool in future educational research. However, due to the COVID-19 pandemic, a limited number of people could be reached, and the survey studies were conducted online.

Keywords: *Information and communication technologies, Attitudes, Scale adaptation, Educational technologies.*

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INTRODUCTION

Education is one of the most critical elements for the development of a society. Information and Communication Technologies is defined as a "major tool for building information societies" by (The United Nations Educational, Scientific and Cultural Organization [UNESCO], 2003, 1). Hence, it is expected that teachers who are among the main education actors effectively use computers and educational technologies and integrate them into their classes (Toprakçı,2007). Effective use of ICT is directly related to the attitude developed by the teacher. Whereby, in the 21st century, technology advances rapidly and classrooms come out of the school buildings, reach virtual reality. Close follow-up of technological developments and the adoption of information and communication technologies in schools is essential for developing and developed countries to shape their future. Various educational technologies can also be used in face-to-face or distance education to serve as a safety valve in extraordinary situations such as the COVID-19 pandemic.

Developments in technology not only cause changes in all areas of social life but also contribute to the transformation of the structure and functions of educational institutions. Institutions that cannot keep up with the technological change cannot fulfill the requirements of the age and become outdated. The "Teaching Competencies" study, which is prepared to make teachers open to professional innovations and to contribute to the support of the national education goals of schools in Turkey, is a performance indicator of the ability to use information and communication technologies for "a learning environment suitable for students with different experiences, characteristics, and abilities" (Ministry of National Education [MoNE],2017). It is of vital importance in reflecting the philosophy of continuous improvement of the Ministry of National Education. Moreover, it is essential for the professional development of educators through adjusting teaching skills into ICT and increasing the quality of the instruction (Etodike *et al*., 2020).

In the second decade of the 21st century, information and innovations change rapidly so the functions of educational institutions also change accordingly. Educational institutions are expected to raise dynamic and qualified individuals who can use the information effectively, so it has been naturally revealed the necessity of technology competencies expected from teachers (Aydın&Semerci 2017). The system requires educational institutions to train individuals who can use technology. This requirement includes the competence to use technology in teaching activities. Thus, societies increase the rate of computers per student to increase the quality of teaching (Akpınar 2003). The fact that there is a positive relationship between increasing the performance of students in general teaching and learning processes and using ICT (Alammary, 2012; Cope & Ward, 2002; Lancashire, 2000).

It is significant to use technological tools such as computers to enrich the learning environment and build more complex thinking skills. Also, with the global pandemic, the digitalization of educational tools has been immediate and essential. In this context, teachers and students need to use technology effectively for the sustainability of education. As a designer in the subject area, especially in distance education, teachers have a crucial role in the digital era. Baylor& Ritchie (2002) state that regardless of the technology's effectiveness, technology will not be used unless instructors have the skills, knowledge, and attitudes necessary to integrate it into the curriculum. This proves that the teachers' attitudes towards information and communication technologies directly affect students' instruction quality. Considering the computer to facilitate teachers' work and its practical use increases education quality in distance education and face-to-face education.

In a case study conducted by Bullock (2004) with two pre-service teachers, it was revealed that the technology attitude and use of technology use of university mentors affect the level of pre-service teachers' level of technology use. From the study's findings, it can be understood that the teachers' attitudes toward technology use are the critical factor to determine the effective implementation of technology use in education (Bullock, 2004).

Implementing technology use in education can be affected by various factors. One of these factors is teachers' attitudes towards information and communication technologies. Previous studies have shown that teachers' computer competence positively correlates with their attitudes toward Information and Communication Technologies (Al-Zaidiyeen, Mei, & Fook, 2008; Berner, 2003;

Mustafina, 2016; Torkzadeh, Chang & Demirhan, 2006; Tondeur, van Braak, & Valcke, 2007). In contrast, a lack of knowledge about computers adversely affects educators' attitudes toward them (Al-Oteawi, 2002). Additional research shows that technology use in educational settings positively correlates with ICT attitudes (Albirini, 2006; Baylor & Ritchie, 2002; Na, 1993).

In Isleem's (2003) 's research, a strong positive correlation existed between the level of computer use and teachers' technology competence and teachers' perceived attitude toward computers. The determining factors of computer use among teachers are their competence, attitude, and level of access to computers. When the literature is reviewed, it can be concluded that adoption of innovations about computer technologies and education in schools is related to teachers' experience, competence, and attitude (Lim & Khine, 2006; Schug, 1998; Smerdon, Cronen, Lanahan, Anderson, Iannotti & Angeles, 2000; Thomas & Stratton, 2006). Similar research conducted with English teachers in the Algerian context shows that the group culture of the participant teachers is more important than the individual characteristics (Etodike *et al*., 2020).

Integrating innovations in ICT into the curriculum is possible with teacher training since teachers' attitudes and competence affect ICT use (Ersoy& Kavaklıoğlu, 2020; Tezci, 2010). Albirini (2006) measured "Syrian EFL teachers' perceptions about their computer knowledge and computer skills by the instrument named TATICT scale developed for his study. Furthermore, the study of Albirini (2006) showed that teachers have a positive attitude towards ICT. However, one of the main obstacles to technology implementation perceived by the teachers in his study is the mismatch between ICT and the existing curricula and the class time frame. So, the development of teachers' positive attitudes toward information and communication technologies effectively fosters computers' use in classroom settings (Watson, 1998). Teachers' attitudes toward computers can play an essential role in the acceptance and actual use of computers (Al-Zaidiyeen *et al.*, 2008). Based on the research mentioned above, it can be concluded that teachers' computer competence affects their attitudes towards ICT. Their attitude towards computers plays a noteworthy role in the acceptance and the use of computers.

Studies to determine teachers' attitudes towards information and communication technologies are very important for educational research. This situation has motivated the acquisition of an understandable and practical scale, which is compatible with the nature and the structure of Turkish to contribute to the literature. There are many advantages to using an adapted scale without creating a new scale. Since developing and adapting a scale is laborious and costly, using an adapted scale saves the researcher/researchers time and enables comparison with other groups in which the scale is used (Borsa et al., 2012). Therefore, this study aims to adapt the scale developed by Albirini (2006) regarding teachers' attitudes towards Information and Communication Technologies into Turkish.

METHOD

In this section, the participants of the study, the study instrument, its adaptation process to the target language, and the application to verify the adapted instrument will be explained.

Participants

The descriptive method was implemented in this scale adaptation study. The group to be applied was selected by the convenient sampling method. The participant group consists of 150 teachers studying in the Sarıyer district of Istanbul in the 2020-2021 academic year. The frequency data regarding the participants' demographic information is presented in Table 1. The data collection process was limited to public primary, secondary, and high school teachers in Sarıyer, Istanbul.

Table 1 shows that the teachers' distribution in the study group according to the school level they work at is given. According to Table 1, 24 of the first study group teachers are 16% primary school, 53(35%) secondary school, 73 of them (48.7%) are working at the high school level.

Table 1. *Demographic information of the sample group*

		n	%
Gender	Male	49	32,7
	German	2	1,3
Field of Study	Information	2	1,3
	Biology	2	1,3
	Geography	4	2,7
	Religion	3	2,0
	Philosophy	2	1,3
	Science	7	4,7
	English	55	36,7
	Chemistry	6	4,0
	Maths (High School)	7	4,7
	Maths(Primary	7	4,7
	School Counsellor	6	4,0
	Classroom Teacher	9	6,0
	Social Sciences	5	3,3
	History	4	2,7
	Turkish Literature	10	6,7
	Turkish	9	6,0
	Other	10	6,7
Levels of Education	Primary School	24	16,0
	Secondary School	53	35,3
	High School	73	48,7
Experience (years)	1-5	22	14,7
	6-10	34	22,7
	11-15	40	26,7
	16-20	27	18,0
	21 years and above	27	18,0

Validity and reliability study

The reliability and validity in the research were conducted essentially to assure that data collected is valid and replicable (Kimberlin & Winterstein, 2008).In this adaptation study of the TATICT Scale, various analyses were carried out to define its reliability and validity. Accordingly, exploratory factor analysis (EFA) was used to define validity. Confirmatory factor analysis (CFA) was applied to test the verifiability of the obtained structure. Item-total correlation coefficients were calculated to determine the adequacy of a significant difference between the lower and upper 27% groups' scores. They were determined according to the total score to distinguish the individuals in terms of the items' characteristics in the scale. A t-test was used to identify whether the reliability of the scale scores was determined. Additionally, Cronbach Alpha's internal consistency coefficient was examined to test the scale's reliability.

Study Instrument

The TATICT Scale developed by Albirini (2006), the original instrument consisted of 73 items under four sub-dimensions, including perceived computer attributes, cultural perceptions, perceived computer competence, and perceived computer access. To reveal the high school EFL teachers' attitudes toward ICT in Syria. The scale was designed as a 5-point Likert scale and implemented as 'Strongly disagree(1)', 'Disagree (2)' 'Neutral (3)', 'Agree (4)', and 'Strongly Agree(5)'. The original instrument was evaluated by a panel of experts for content and face validity (Albirini, 2006). The Turkish form was adapted from the computer attributes-attitude sub-dimensions of the scale, which includes 15 items. Two items out of fifteen are negative.

Implementation

Firstly, permission was obtained from Albulkafi Albirini, the researcher from the University of Ohio who developed the scale to examine TATICT. Later, four different English teachers, including the researcher herself, translated the scale into Turkish. Two different Turkish language experts corrected Turkish translations. Since the backward translation process is the most crucial step inscale adaptation studies (Cha, Kim,& Erlen, 2007), the scale was translated back from Turkish to English and sent to a native English speaker for the last review.

In line with expert recommendations, some items were excluded from the scale due to cultural and linguistic reasons, and the final version of the scale consisting of 15 items was from the attributes-attitude sub-dimension. So, the Turkish form has been given its final form. After completing these stages, evaluations regarding linguistic, cultural, structural, and content suitability have been completed. According to Hambleton, Merenda, and Spielberger (2009), the test developers should be aware of the sample group's linguistic and cultural factors. Additionally, the researchers applied to the Yildiz Technical University Ethics Committee. After the ethics committee's approval for the study, linguistic equivalence and reliability validity were applied.

The responsible researcher contacted the English teachers in Sarıyer District for a linguistic equivalence study. For the reliability validity study, the researcher applied to the schools where he worked in the same district. World and Turkey under the influence of Covid -19 pandemic forms are not distributed by hand instead collected via the google forms application. Linguistic equivalence study 41 English teachers were first applied to the 15-item English form, and three days later, the 15-item Turkish form, which was an adaptation study, wasapplied. The validity and reliability studies were conducted with a larger group of teachers (150 people) from different majors only on the Turkish form.

FINDINGS

Within the study's scope, English teachers answered the questionnaire in English and Turkish, and the consistency of the answers was examined. As a result of comparing English questionnaires and Turkish questionnaires in terms of item and total score. There is no statistically significant difference between English and Turkish in any item or score (p> 0.05).

Validity and reliability studies and findings to adapt the Attitude Scale of Teachers towards Information and Communication Technologies to Turkish are presented below.

Table 2. *Linguistic Equavilance (t-test)*

		n	Mean	Std.	t	p-value
Item 1	English	41	4,37	,490	-1,088	,281
	Turkish	41	4,53	,681		
Item 2	English	41	4,10	,960	-,428	,670
	Turkish	41	4,20	,847		
Item 3	English	41	4,43	,504	,000	1,000
	Turkish	41	4,43	,504		
Item 4	English	41	4,17	,874	-,435	,665
	Turkish	41	4,27	,907		
Item 5	English	41	4,10	,885	-,145	,885
	Turkish	41	4,13	,900		
Item 6	English	41	4,30	,837	-1,687	,097
	Türkçe	41	4,60	,498		
Item 7	English	41	4,20	,610	,846	,401
	Turkish	41	4,03	,890		
Item 8	English	41	4,27	,521	-,457	,650
	Turkish	41	4,33	,606		
Item 9	English	41	3,90	1,125	-,223	,824
	Turkish	41	3,97	1,189		
Item 10	English	41	4,00	,788	-,571	,570
	Turkish	41	4,13	1,008		
Item 11	English	41	4,10	,759	-,469	,641
	Turkish	41	4,20	,887		
Item 12	English	41	3,67	1,124	,457	,650
	Turkish	41	3,53	1,137		
Item 13	English	41	4,33	,661	-,175	,862
	Turkish	41	4,37	,809		
Item14	English	41	4,67	,479	,266	,791
	Turkish	41	4,63	,490		
Item 15	English	41	4,53	,681	,710	,480
	Turkish	41	4,40	,770		
Overall Point	English	41	4,2089	,4873	,311	,757
	Turkish	41	4,2511	,5628		

A t-test was conducted to evaluate linguistic equivalence. The t-test can be performed with a paired t-test for paired data. Since the T-test is a parametric test, sample groups must meet prerequisites such as normality, equal variances, and independence (Kim, 2015).

Within the scope of the study, 41 English teachers answered the questionnaire in English and Turkish. In this context, the consistency of the answers given to the questions was examined. Asa result of comparing English questionnaires and Turkish questionnaires in terms of item and total score, no statistically significant difference was found between English and Turkish in any item or score (p> 0.05).

Validity and Reliability Analysis

An exploratory factor analysis was used to determine the construct validity of the scales used in the study. KMO and Bartlett tests were conducted to understand whether the scale is suitable for factor analysis. While the KMO coefficient is calculated to test the sample's size, the normal distribution condition is examined with the Bartlett test. In this context, the KMO test measurement result should be .50 and higher, and the Bartlett sphericity test result should be statistically significant (Jeong, 2004: 70). In the factor analysis process, factor load values were examined to scale items to factors or remove them from the scale.

According to Field (2000), the value of 0.50 should be the lower limit for the Kaiser-Meyer-Olkin test. He also stated that the data set for KMO≤0.50 could not be factored in. Accordingly, it is expected that the Barlett Test will be significant, and the Kaiser-Meyer-Olkin Test will be higher than 0.50. Barlett Test and Kaiser-Meyer-Olkin test results are presented in Table 3 below.

Table 3. *KMO and Bartlett Values of the Scale*

KMO		0,924
Bartlett Test	x^2	1094,568
	sd	105
	p	0,000

In the factor analysis for the scale, the KMO value was calculated as 0.924. Accordingly, the sample size is suitable for factor analysis (KMO> 0.500). Within the Bartlett test scope, the X2 value was calculated as 1094.568 and was found to be statistically significant (p <0.05). Accordingly, the normal distribution condition was achieved. According to the KMO and Bartlett test results, it was concluded that the data were suitable for factor analysis. The high value of Kaiser-Meyer means that variables can correctly predict each variable in the scale. If the values are zero or close to zero, these values cannot be interpreted because thereis a mess in the correlation distribution. As a result of the Kaiser-Meyer-Olkin test, the value If it is less than 0.50, factor analysis cannot be continued (Çokluk et al., 2014).The Scree Plot graph showing the distribution of eigenvalues and eigenvalues of factors was examined to determine the scale's factor structure.

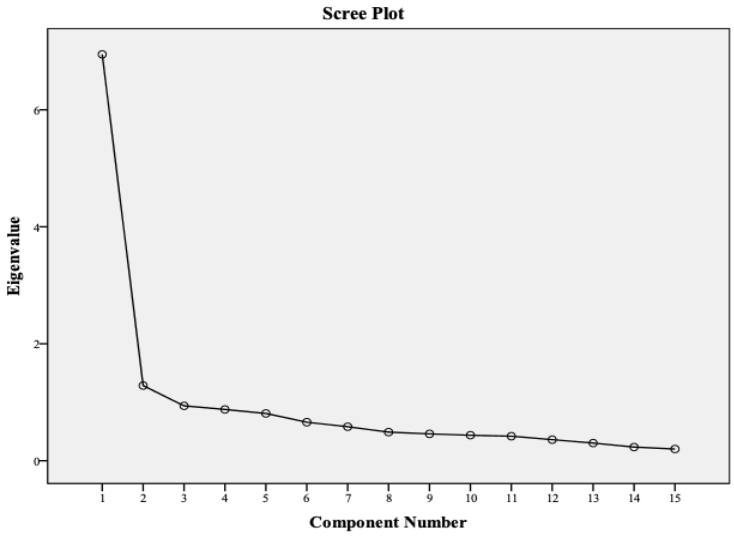

Figure 1.*The Scree Plot Graph*

When the Scree plot graph is interpreted as high acceleration, fast drops on the graph living factor

gives many important factors. Horizontal stripes indicate the relative contribution of the additional variances of the factors (Büyüköztürk,2002).

As seen in the graph, it was decided that the scale had a 2-factor structure. To determine the distribution of the questions in the 2-factor structure, the number of factors was analyzed by varimax rotation as 2, and the distribution and factor loadings of the questions were given in thetable. As a result of the analysis, no item came out of the scale. The explanation rate of the total variance of the scale was calculated as 54.894%. However, Cronbach's Alpha coefficient of the second factor of the scale was calculated as 0.492. Therefore, it was decided to analyze the scale with one factor. In the single factor scale structure, no items were removed from the scale, and the ratio of explaining the total variance of the scale was calculated as 46.323%.

The eigenvalue is a one-factor analysis, and higher factors are taken as important factors. A factor must be equivalent to at least one of the variables with a variance of 1.00.

Furthermore, there are as many factors as the number of variables and an eigenvalue calculated accordingly. The variance explained by a factor is obtained by dividing the factor's eigenvalue bythe number of variables (Büyüköztürk, 2002).

Table 4. *Eigenvalues and Explained Variance Values*

Eigenvalues Factor	Extraction Sums of Squared Loadings					
	Total	**Variance %**	**Toplam %**	**Total**	**Variance %**	**Total %**
1	6,948	46,323	46,323	6,948	46,323	46,323
2	1,286	8,571	54,894			
3	0,938	6,256	61,149			
4	0,877	5,849	66,999			
5	0,808	5,390	72,388			
6	0,658	4,388	76,777			
7	0,582	3,880	80,657			
8	0,489	3,261	83,917			
9	0,460	3,064	86,982			
10	0,436	2,910	89,891			
11	0,420	2,798	92,689			
12	0,360	2,403	95,093			
13	0,302	2,012	97,105			
14	0,234	1,562	98,667			
15	0,200	1,333	100,000			

When Table 4 is examined, the scale forms a single-factor structure according to the essential components used in the variance analysis, and the varimax vertical rotation technique formed accordingly. This single factor structure explains 46,323% of the total variance. The variance explanation rate of the scale was calculated as 46.323%. Accordingly, the variance explanation rate is high.

Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA)aims to examine the extent to which a predetermined or constructed structure is verified with the collected data. On the other hand, the exploratory factor analysis determines the data's factor structure based on factor loadings without any hypothesis (Sümer, 2000).

Various fit indices can be used to determine the adequacy of the model tested in CFA. It is recommended to implement several fit index values to determine the model's fit. The most frequently used of these are (Cole, 1987; Sümer, 2000) Chi-Square Goodness Test (Chi-Square Goodness), Goodness Fit Index (GFI), Adjusted Goodness Fit Index (AGFI), Comparative Fit Index (CFI), Normed Fit Index. (NFI) is Root Mean Error (RMR or RMS) and Root Mean Square Error of Approximate (RMSEA) (Büyüköztürk et al.,2021).In the study, CFA analysis was made with the AMOS 24.0 program, and factor structures were examined.

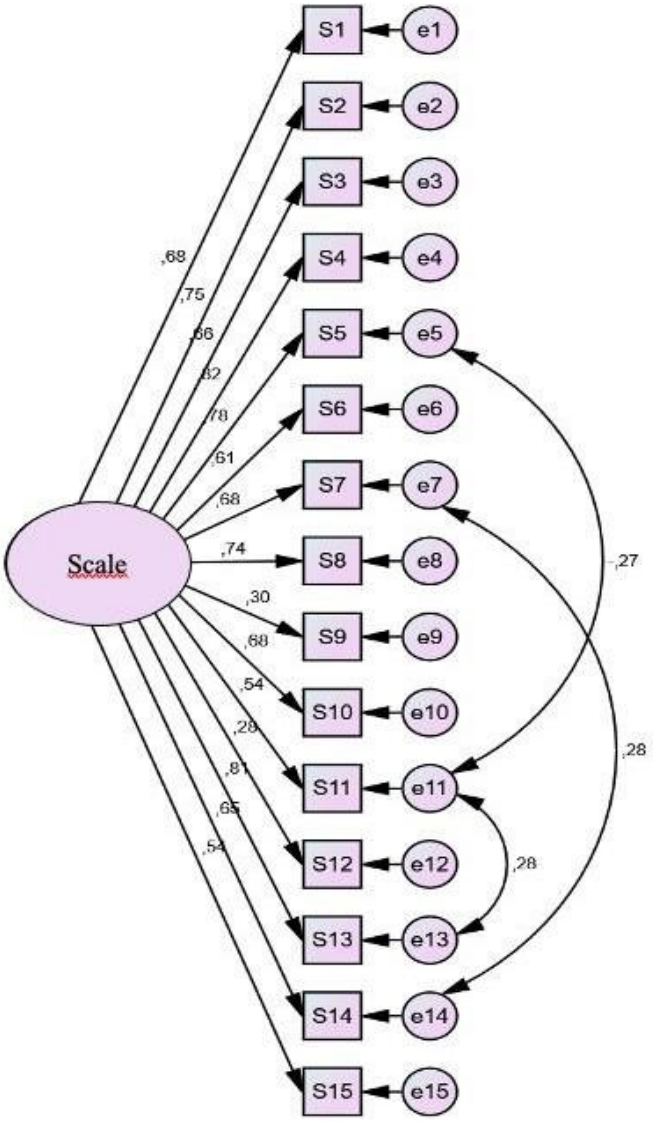

Figure 2. *Confirmatory Factor Analysis*

Table 5. *Availability of Confirmatory Factor Analysis Fit Indices*

Index	Acceptable Fit Indices	Scale
x^2	x	144,096
sd	x	87
x^2/sd	≤ 5	1,656
RMR	≤ 0,08	,038
GFI	≥ 0,90	,880
AGFI	≥ 0,85	,834
CFI	≥ 0,90	,945
RMSEA	≤ 0,08	,066

Accordingly, being smaller than three indicates the model's fit for the general model fit (Şimşek, 2007). GFI, AGFI, NFI, and CFI values of 0.95 or above are acceptable for a good fit, and between

0.9 and 0.94.RMR and SRMR values less than 0.05, good fit, between 0.06 and 0.08indicates acceptable harmony (Çokluk, Şekercioğlu, & Büyüköztürk, 2014). Made The goodness of fit indicators calculated as a result of the confirmatory factor analysis are given in Table 5. The compliance indexes of the scale according to the CFA results are shown in the table. While the chi-square fit index, RMR, CFI, RMSEA indices were completely provided, GFI and AGFI were almost provided. Based on these results, it can be concluded that the scale is valid.

Table 6. *Analysis Results Regarding the Factors of the Scale*

	Factor
13. I like to use computers in teaching.	,835
4. Using computers is enjoyable.	,826
5. Computers make me more productive.	,784
2. Using a computer would make the subject matter more interesting.	,780
8. Computers can enhance students' learning.	,758
10. Computers will improve education.	,721
7. Computers have proved to be effective learning tools.	,717
1. Computers would help me organize my work.	,705
3. Computers save time and effort.	,699
14. Computers are a fast means of getting information.	,693
6. Using computers offers real advantages.	,645
11. Computers do not scare me at all.	,571
15. I would like to learn more about computers.	,570
9. I would rather do things by hand than with a computer.	-,334*
12. I do not like talking with others about computers.	-,311*

According to the analysis results, the scale consists of 15 questions with factor loads ranging from 0.311 to 0.835. The 9th and 12th questions of the scale are reverse coded.

Table 7. *Distribution of Standardized Regression Coefficients for Scale Items*

Item	β	(SE)	t	p
S01	0,676			
S02	0,748	0,162	8,336	0,000
S03	0,658	0,139	7,420	0,000
S04	0,823	0,185	9,058	0,000
S05	0,785	0,178	8,688	0,000
S06	0,609	0,120	6,910	0,000
S07	0,682	0,174	7,665	0,000
S08	0,738	0,149	8,236	0,000
S09	0,304	0,237	3,544	0,000
S10	0,684	0,157	7,683	0,000
S11	0,538	0,175	6,093	0,000
S12	0,280	0,257	3,273	0,001
S13	0,815	0,168	8,978	0,000
S14	0,648	0,113	7,312	0,000
S15	0,542	0,154	6,193	0,000

The std. regression coefficients and significance of the items are given in the table.

Internal consistency reliability

Cronbach's alpha coefficient gives the reliability level of the scale, so Cronbach's alpha coefficient is calculated within the reliability analysis scope. The Cronbach's alpha reliability coefficients for the original scale was examined as computer attitude = 0.90, computer attributes = 0.86, cultural perceptions = 0.76, and computer competence = 0.94.

The fact that good reliability indices were obtained indicates that the measuring tool is precise and shows results consistent in the different applications. The acceptable value of Cronbach's alpha is 0.7. However, 0.80 or greater is preferred (Büyüköztürk, 2019; Taber,2018). The Cronbach's alpha coefficient, which was calculated as α = 0,891 for the adapted scale, shows that the adapted scale is reliable.

Distinguishing Properties of Substances

Item analysis is performed based on the difference between item-total correlations and 27% lower-upper group averages given in table 8 to determine each item's contribution that makes up the TATICT scale and their relations with the whole scale.

Table 8. *Subgroup-Upper Group Comparison*

		n	Mean	Sd	t	p-value
1. Computers help me organize my work.	Subgroup	41	3,98	0,651	**-9,558**	**0,000***
	Upper group	41	4,98	0,156		
2. Using a computer would make the subject matter more interesting.	Subgroup	41	3,66	0,762	**-10,052**	**0,000***
	Upper group	41	4,95	0,312		
3. Computers save time and effort.	Subgroup	41	3,93	0,685	**-9,556**	**0,000***
	Upper group	41	4,98	0,156		
4. Using computers is enjoyable.	Subgroup	41	3,24	0,799	**-13,614**	**0,000***
	Upper group	41	4,98	0,156		
5. Computers make me more productive.	Subgroup	41	3,46	0,809	**-11,367**	**0,000***
	Upper group	41	4,95	0,218		
6. Using computers offers real advantages.	Subgroup	41	4,05	0,312	**-12,067**	**0,000***
	Upper group	41	4,93	0,346		
7. Computers have proved to be effective learning tools.	Subgroup	41	3,46	0,778	**-10,359**	**0,000***
	Upper group	41	4,88	0,400		
8. Computers can enhance students' learning.	Subgroup	41	3,71	0,642	**-12,291**	**0,000***
	Upper group	41	4,98	0,156		
9. I would rather do things by hand than with a computer.	Subgroup	41	3,17	1,046	**-4,234**	**0,000***
	Upper group	41	4,24	1,241		
10. Computers will improve education.	Subgroup	41	3,56	0,709	**-11,564**	**0,000***
	Upper group	41	4,93	0,264		
11. Computers do not scare me at all.	Subgroup	41	3,59	0,921	**-7,585**	**0,000***
	Upper group	41	4,80	0,459		
12. I do not like talking with others about computers	Subgroup	41	2,80	1,167	**-5,143**	**0,000***
	Upper group	41	4,15	1,195		
13. I like to use computers in teaching.	Subgroup	41	3,51	0,810	**-10,984**	**0,000***
	Upper group	41	4,95	0,218		
14. Computers are a fast means of getting information.	Subgroup	41	4,10	0,374	**-13,856**	**0,000***
	Upper group	41	4,98	0,156		
15. I like to learn more about computers.	Subgroup	41	3,83	0,771	**-7,729**	**0,000***
	Upper group	41	4,88	0,400		
Total	Subgroup	41	54,0488	4,69548	**-22,930**	**0,000***
	Upper group	41	72,5366	2,14590		

*p<0,05

To test the split-half reliability or equivalent reliability, all items were divided randomly divided into two sets to measure the same construct. The split-half reliability estimate is simply the correlation between these two total scores.

After the 150 data were divided into 27% subgroup and 27% upper group according to the total score, a t-test was conducted to compare them.

The results indicate a statistically significant difference between the lower and upper groups for each item of the scale (p <0.05).

T-test results to determine the distinctiveness of the scale items that there is a significant difference between the lower 27% and upper 27% groups (p <, 05), and all items show that it has a high distinguishing feature.

CONCLUSION AND RECOMMENDATIONS

This study aims to adapt the Teacher's Attitudes toward Information and Communication Scale developed by Abdulkafi Albirini (2006) into Turkish and examine the adapted scale's reliability and validity. The study was carried out in three stages; First, three different translations of the scale were made from English to Turkish, and the translations obtained were then translated again using the back translation method. It was discussed, and the translation was finalized. In the translation phase of the scale, 4 English experts, 1 Turkish teaching expert, and 1 Turkish language expert took part. In the second stage, the scale items.

Necessary for the semantic level in Turkish to be suitable for teachers who are the target audience. arrangements have been made. The Turkish form and English form were applied to two different groups of teachers. The first group was 41 English teachers who participated in the study for linguistic equivalence for Turkish and English forms, while the Turkish form was applied to 150 teachers from different fields. As a result of comparing the English scale and Turkish scale in terms of item and total score, no statistically significant difference was found between English and Turkish in any item or score ($p > 0.05$).

In the third stage, the validity and reliability of the scale studies have been done. According to the exploratory factor analysis conducted to determine the scale's validity, TATICT was determined that the attitude scale has a single factor structure. To verify the factor structure resulting from the exploratory factor analysis. The factorial validity of the Teachers' Attitudes Toward ICT scale was tested through Confirmatory Factor Analysis. Moreover, the results (CFA) show that the scale has an acceptable goodness of fit.

The means of the lower 27% and upper 27% groups with the t-test to determine the significant differences were observed between the two groups' results. After dividing the scale into twogroups, the correlation between these two parts was analyzed, and it was found to be significant, which shows that the scale is reliable. Furthermore, to evaluate the scale's reliability, internal consistency was assessed using Cronbach's alpha, and Cronbach's alpha coefficient was computed to be 0.891. For acceptable reliability variance explanation rate is 46.323%, to be high. Additionally, the Availability of Confirmatory Factor Analysis Fit Indices shows that the chi-square fit index, RMR, CFI, RMSEA indices were completely provided, GFI and AGFI were almost provided.

There are many advantages to using an adapted scale. Since developing and adapting a scale is laborious and costly, using an adapted scale saves the researcher/s time and provides the opportunity to compare with other groups in which the scale is used (Borsa et al., 2012). Some issues have been taken care of in the adaptation of this scale, and researchers who will make scale adaptation studies in the future should pay attention. (1) Permission must be obtained from the author/s of the scale before adapting the scale.(Erkuş,2007;Hambleton&Patsula,1999). Since societies and information technologies change rapidly, cultures adapt to this. It should be determined whether the scale to be adapted is suitable for the target culture. Dimensions/items that are not suitable for culture can be removed by informing the author of the scale. The translation and candidate adapted scale should be culturally acceptable (Akbaş & Kormaz, 2007). Çapık, Gözüm&Aksayan, 2018). (2) It is important to select qualified translators who are well-versed in both cultures (Hambleton & Patsula, 1999). In the scale adaptation study, it is essential to translate in an academic language that the speakers of the target language can understand rather than word by word translation. (3) A trial application should be made for the adapted scale. Since the quality of this application will affect the reliability and validity of the scale, it is appropriate to have a random group with the same characteristics as the main target group to which the scale will be applied (Erkuş, 2007).

Since the TATICT scale, which was adapted into Turkish, is an attitude scale, researchers who will use the scale in the future should associate the data they obtained with different variables such as professional seniority, gender, school type. In addition, in schools where the attitude score is generally low, various measures can be taken for teacher competencies in educational institutions by using the computer competency scale to see if the negative attitude is inversely proportional to the competency. Based on the adaptation process, it can be said that the scale is suitable for identifying teachers' attitudes

towards technology in the Turkish context. The adapted scale can be implemented in further research in Turkish. According to the validity and reliability studies, the scale is a valid and reliable measurement measuring TATICT.

However, the findings of this study should be evaluated in terms of some limitations. Due to the COVID-19 pandemic, a limited number of people could be reached, and the survey studies were conducted online. Moreover, future research on different samples may contribute to the generalization of the research findings. Total scores can be calculated by it is being added different dimensions of computer use to the scale. A new study can be made by evaluating the relationship between teachers' demographic characteristics and their attitudestowards computers. The relationship between teachers' computer skills and attitude can be examined. This scale is easy to use because it is precise and reliable. In this context, it is expected that the research will lead to research by using tests with more extensive and different samples.

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Appendix 1. *Turkish Adaption of the TATICT Scale***.**

BİT'e Yönelik Öğretmen Tutum Ölçeği (Albirini, 2006)					
1. Bilgisayar, çalışmalarımı düzenlememe yardımcıolur.	1	2	3	4	5
2. Bilgisayar kullanmakders konularını daha ilgi çekici hale getirir.	1	2	3	4	5
3. Bilgisayar zamandanve emekten tasarruf etmeyi sağlar.	1	2	3	4	5
4. Bilgisayar kullanmak eğlencelidir.	1	2	3	4	5
5. Bilgisayar beni dahaüretken kılar. (Kullanmak eklemeli miyim?)	1	2	3	4	5
6. Bilgisayar kullanmakönemli avantajlar sunar.	1	2	3	4	5
7. Bilgisayarın etkili öğrenme aracı olduğukanıtlanmıştır.	1	2	3	4	5
8. Bilgisayar, öğrencilerin öğrenimsüreçlerini zenginleştirir.	1	2	3	4	5
9. Çalışmalarımı bilgisayar kullanarak yapmaktansa elle yapmayı tercih ederim.	1	2	3	4	5
10. Bilgisayar, eğitimin niteliğini arttırmaktadır.	1	2	3	4	5
11. Bilgisayar kullanmak beni hiçkorkutmaz.	1	2	3	4	5
12. Başkalarıyla bilgisayarlar hakkındakonuşmaktan hoşlanmıyorum.	1	2	3	4	5
13.Öğretim sürecinde bilgisayar kullanmayı seviyorum	1	2	3	4	5
14. . Bilgisayar, bilgiyi hızlı elde etme aracıdır.	1	2	3	4	5
15. Bilgisayar hakkında daha çok şey öğrenmek istiyorum.	1	2	3	4	5

(1)Kesinlikle katılmıyorum; (2) Katılmıyorum; (3) Kararsızım; (4) Katılıyorum; (5) Kesinlikle Katılıyorum

Öğretmenlerin Bilgi ve İletişim Teknolojilerine Yönelik Tutumları Ölçeği: Türkçeye Uyarlama Çalışması

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Özet

Bu çalışmanın amacı, öğretmenlerin Bilgi ve İletişim Teknolojilerine yönelik tutumlarına ilişkin Albirini (2006) tarafından geliştirilen ölçeğin Türkçeye uyarlanmasıdır. Ölçek uyarlama çalışmalarının güvenirlik geçerlik çalışmalarına başlamadan önce dilsel eşdeğerliklerinin sağlanması gerektiği için, orijinal ölçeğin araştırmacılar tarafından Türkçe 'ye çevirisini takiben çeviri, çevirilerin değerlendirilmesi, uzman görüşü, geri çeviri, çevirinin değerlendirilmesi ve uzman görüşü aşamaları altı farklı uzman tarafından uygulanmıştır. Ölçeğin nihai hali, aynı zamanda Türkçe öğretmeni olan uzmanlarla görüşülmüş ve Türkçe'nin dil yapısı ile uyumlu, kültürel açıdan kabul edilebilir bir çeviri gerçekleştirilmesine özen gösterilmiştir. Ölçeğin dilsel eşdeğerliğine ilişkin veri sağlamak amacıyla, İstanbul ili Sarıyer ilçesinde görev yapan İngilizce öğretmenlerine farklı zamanlarda ölçeğin orijinal İngilizce formu ve Türkçe çevirisi uygulanmıştır. Dilsel eşdeğerlik sağlandıktan sonra, uyarlama ölçeğin, geçerlik ve güvenirlik çalışmaları için betimsel yöntem kullanılmış olup, katılımcılar uygun örnekleme yöntemi ile seçilmişlerdir. Araştırmanın katılımcılarını 2020-2021 eğitim öğretim yılında İstanbul ili Sarıyer ilçesindeki ilkokul, ortaokul ve liselerde görev yapan farklı disiplinlerden 150 öğretmen oluşturmaktadır. Geçerliliği ölçmek için açıklayıcı faktör analizi, t-testi, korelasyon ve iç tutarlılık için Cronbach alfa katsayısı hesaplanmıştır. Ölçeğin yapı geçerliğini sağlamak için doğrulayıcı faktör analizi yapılmıştır. Cronbach alfa güvenirlik katsayısı α = 891 olarak hesaplanmıştır ve 0,7'den büyük olduğundan TAICT ölçeğinin Türkçe uyarlaması güvenilir olarak değerlendirilebilir. Bu Türkçe 'ye uyarlama çalışmasının, ilerde yapılacak eğitim araştırmalarında, öğretmenler ve bilgisayar teknolojileri üzerine yapılacak araştırmalarda araç olarak kullanılması, bilime katkı sağlaması beklenmektedir. Ancak COVID-19 pandemisi nedeniyle sınırlı sayıda kişiye ulaşılabilmiş ve anket çalışmaları online olarak gerçekleştirilmiştir.

Anahtar Kelimeler: *Bilgi ve iletişim teknolojileri, Tutumlar, Ölçek uyarlama, Eğitim teknolojileri.*

E-Uluslararası Eğitim Araştırmaları Dergisi

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Genişletilmiş Özet

Problem: Eğitim, bir toplumun gelişmesi için en kritik unsurlardan biridir. Bilgi ve İletişim Teknolojileri, "bilgi toplumlarının oluşturulması için temel bir araç" olarak tanımlanmaktadır (UNESCO 2003, 1). Bu nedenle, eğitimin ana aktörleri arasında yer alan öğretmenlerin bilgisayarları ve eğitim teknolojilerini etkin bir şekilde kullanmalarını beklenmektedir (Toprakçı,2007). Bilgi ve iletişim teknolojileri (BİT)'nin etkin kullanımı, öğretmenlerin teknoloji kullanımına yönelikj tutumla doğrudan ilgilidir. Bu nedenle, teknolojinin hızla ilerlediği, sınıfların dört duvar arasından çıkarak sanalda gerçekliğe ulaştığı 21.yüzyılda, eğitimin ve toplumun bilgi toplumuna dönüşümünün başrollerinden biri olan öğretmenlerin bilgi ve iletişim Teknolojilerine (BİT) yönelik tutumlarını ölçmek ve bunun sonucunda hizmetiçi eğitimlerine ve okulların şartlarına yönelik düzenlemeler yapmak oldukça önemli görünmektedir.

Gelişmekte olan ve gelişmiş ülkelerin geleceklerini şekillendirmeleri için teknolojik gelişmelerin yakından takip edilmesi ve okullarda bilgi ve iletişim teknolojilerinin benimsenmesi şarttır. Yüz yüze, hibrit veya uzaktan eğitimde, pandemi gibi olağanüstü durumlarda, çeşitli eğitim teknolojileri adeta bir emniyet valfi götrevini üstlenmektedirler. Teknolojik gelişmeler sosyal yaşamın her alanında değişikliklere neden olduğu gibi eğitim kurumlarının da yapı ve işlevlerinin dönüşümüne katkı sağlamaktadır. Değişime ayak uyduramayan kurumlar ise, çağın gerekliliklerini yerine getirememekte ve köhneleşmektedir. Türkiye'de öğretmenlerin mesleki anlamda yeniliklere açık olması ve okulların Ulusal eğitim hedeflerinin desteklenmesine katkı sağlamak amacıyla hazırlanan "Öğretme Yeterlilikleri" çalışması, "Farklı deneyim, özellik ve yeteneklere sahip öğrencilere uygun bir öğrenme ortamı" için bilgi ve iletişim teknolojilerini kullanma becerisi performans göstergesidir (MEB, 2017). Milli Eğitim Bakanlığı'nın sürekli gelişme felsefesini yansıtmada hayati önem taşımaktadır. Çünkü 21. Yızylın ikinci on yılında bilgi çok hızlı ki bir araştırma yapılırken onun geçerliliğini kaybettirecek yeni bir buluş ortaya çıkmaktadır. Buna bağlı olarak Eğitim kurumlarından beklentiler de aynı yönde değişmektedir. Eğitim kurumlarının, sınırsız bilgi kaynakları arasında doğru bilgiye erişerek, elde ettikleri bilgileri, insanlığın ve ülkesinin iyiliğini önceleyerek kullanabilecek dinamik ve nitelikli bireyler yetiştirmeleri beklenir. Bu beklenti doğal olarak öğretmenlerden beklenen bilgi, beceri ve yetkinliklerin değiştirilmesi gerekliliğini ortaya çıkarmıştır (Aydın ve Semerci 2017).Sistem, eğitim kurumlarının teknolojiyi kullanabilen bireyler yetiştirmesini gerekli kılar. Bu gereklilik, öğretim etkinliklerinde teknolojiyi kullanma yeterliliğini içerir. Böylelikle toplumlar, öğretim kalitesini artırmak için öğrenci başına düşen bilgisayar oranını oranını artırmaktadır (Akpınar 2003) Genel öğretim ve öğrenme süreçlerinde öğrencilerin performansını artırmak ile BİT'i kullanmak arasında pozitif bir ilişki olduğu da yapılan araştırmalardan edinilen sonuçlarla desteklenmektedir (Alammary, 2012; Cope,&Ward,2002;Lancashire,2000).

Ölçek uyarlama çalışmalarının güvenirlik geçerlik çalışmalarına başlamadan önce dilsel eşdeğerliklerinin sağlanması gerektiği için, orijinal ölçeğin araştırmacılar tarafından Türkçe 'ye çevirisini takiben çeviri, çevirilerin değerlendirilmesi, uzman görüşü, geri çeviri, çevirinin değerlendirilmesi ve uzman görüşü aşamaları altı farklı uzman tarafından uygulanmıştır. Ölçeğin nihai hali, aynı zamanda Türkçe öğretmeni olan uzmanlarla görüşülmüş ve Türkçe'nin dil yapısıyla uyumlu bir çeviri gerçekleştirilmesine özen gösterilmiştir.

Öğretmenlerin bilgi ve iletişim teknolojilerine yönelik tutumlarının belirlenmesine yönelik çalışmalar, eğitim araştırmaları için çok önemlidir. Bu durum konu ile ilgili Türkçe'ye uygun, anlaşılabilir ve pratik bir ölçeğin eğitim bilimleri literatürüne kazandırılmasında motivasyon oluşturmuştur. Yeni bir ölçek oluşturulmadan, uyarlanmış bir ölçek kullanmanın birçok avantajı vardır. Ölçek geliştirmek ve uyarlamak zahmetli ve maliyetli olduğundan, uyarlanmış ölçek kullanmak araştırmacıya/araştırmaclara zaman kazandırır ve ölçeğin kullanıldığı diğer gruplarla karşılaştırma olanağı sağlar (Borsa vd., 2012).Bu nedenle, bu çalışmanın amacı, öğretmenlerin Bilgi ve İletişim Teknolojilerine yönelik tutumlarına ilişkin Albirini (2006) tarafından geliştirilen ölçeğin Türkçeye uyarlanmasıdır.

Yöntem: Bu çalışmada betimsel yöntem uygulanmıştır. Uygulanacak grup, uygun örnekleme yöntemi ile seçilmiştir. Örnek grup, 2020-2021 eğitim-öğretim yılında İstanbul'un Sarıyer ilçesinde ilk, orta ve liselerde öğrenim gören 150 öğretmenden oluşmaktadır. Veri toplama süreci İstanbul Sarıyer'de bulunan ilkokul, ortaokul ve lise öğretmenleriyle sınırlandırılmıştır. Dilsel eşdeğerlik çalışması için ikinci

bir çalışma grubu olan 41 İngilizce öğretmenine hem Türkçe hem İngilizce form belirli aralıklarla uygulanmıştır. Türkçe'ye uyarlanan ölçe, 5li likert tipidir ve 15 maddeden oluşmaktadır.

İlk olarak öğretmenlerin bilgi vei iletişim teknolojilerine yönelik tutum ölçeğini Türkçeye uyarlamak için ölçeği geliştiren ve Ohio Üniversitesi'nde akademisyen olan Albulkafi Albirini'den izin alınmıştır. Daha sonra dört farklı İngilizce öğretmeni ölçeği Türkçe'ye çevirmiştir. İki farklı Türkçe dil uzmanı Türkçe çevirileri düzeltmiştir. Ölçek uyarlama çalışmalarında geriye çeviri süreci en önemli adım olduğundan (Cha, Kim ve Erlen, 2007), ölçek Türkçe'den İngilizce'ye geri çevrilmiş ve son gözden geçirme için anadili İngilizce olan bir kişiye gönderilmiştir. Albirini (2006) tarafından geliştirilen TATICT Ölçeği, orijinal araç algılanan bilgisayar özellikleri, kültürel algılar, algılanan bilgisayar yeterliliği ve algılanan bilgisayar erişimi olmak üzere dört alt boyut altında 73 maddeden oluşmaktadır. Suriye'deki lise İngilizce öğretmenlerinin BİT'e yönelik tutumlarını ortaya çıkarmak. Ölçek 5'li Likert tipi olarak tasarlanmış ve 'Kesinlikle katılmıyorum(1)', 'Katılıyorum (2)' 'Nötr (3)', 'Katılıyorum (4)' ve 'Kesinlikle Katılıyorum(5)' şeklinde uygulanmıştır. . Orijinal araç, içerik ve görünüş geçerliliği için bir uzmanlar paneli tarafından değerlendirilmiştir(Albirini, 2006).Türkçe formu, 15 maddeden oluşan ölçeğin bilgisayar özellikleri-tutum alt boyutlarından uyarlanmıştır. On beş maddeden ikisi olumsuzdur. Uzman önerileri doğrultusunda bazı maddeler kültürel ve dilsel nedenlerle ölçekten çıkarılmış ve 15 maddeden oluşan ölçeğin son hali öznitelikler-tutum alt boyutundan yapılmıştır. Orijinal ölçek 2006 yılında oluşturulduğundan ve o yıldan bu zamana birçok teknolojik gelişme olduğundan güncelliğini korumayan boyutlar Türkçe forma eklenmemiştir. Böylece Türkçe forma son şekli verilmiştir.

Öğretmenlerin Bilgi ve İletişim Teknolojilerine Yönelik Tutumları Ölçeği Türkçe'ye uyarlanmış ve geçerliliğini ve güvenirliğini belirlemek için çeşitli analizler yapılmıştır. Geçerliliği tanımlamak için açımlayıcı faktör analizi (AFA) kullanılmıştır. Elde edilen yapının doğrulanabilirliğini test etmek için doğrulayıcı faktör analizi (DFA) uygulanmıştır. Ölçeğin yapısal geçerliliğini sağlamak için doğrulayıcı faktör analizi yapılmıştır. Madde-toplam korelasyon katsayıları, toplam puana göre belirlenen alt ve üst% 27'lik grupların puanları arasındaki anlamlı bir farkın yeterliliğini belirlemek için hesaplanmıştır. Ölçek puanlarının güvenirliğinin belirlenip belirlenmediğini belirlemek için t testi kullanılmıştır. Ölçeğin güvenirliğini test etmek için Cronbach Alpha iç tutarlılık katsayısı hesaplanmıştır.

Bulgular: Dilbilimsel Eşitlik, t-testi: Çalışma kapsamında 41 İngilizce öğretmeni anketi İngilizce ve Türkçe olarak cevapladı. Bu kapsamda sorulara verilen cevapların tutarlılığı incelenmiştir. İngilizce anketler ile Türkçe anketlerin madde ve toplam puan açısından karşılaştırılması sonucunda hiçbir madde veya puan açısından İngilizce ve Türkçe arasında istatistiksel olarak anlamlı bir fark bulunmamıştır (p> 0.05).

Ölçek için faktör analizinde KMO değeri 0,924 olarak hesaplanmıştır. Buna göre örneklem büyüklüğü faktör analizi için uygundur (KMO> 0.500). Bartlett testi kapsamında X2 değeri 1094,568 olarak hesaplanmış ve istatistiksel olarak anlamlı bulunmuştur (p <0,05). Buna göre normal dağılım durumuna ulaşılmıştır.. KMO ve Bartlett testi sonuçlarına göre verilerin faktör analizine uygun olduğu sonucuna varılmıştır. Tek faktörlü ölçek yapısında ölçekten hiçbir madde çıkarılmamış olup, ölçeğin toplam varyansını açıklama oranı% 46.323 olarak hesaplanarak yüksek bir açıklama oranı ifade edilmiştir. Ölçeğin DFA sonuçlarına göre uyum indeksleri tabloda gösterilmiştir. Ki-kare uyum indeksi, RMR, CFI, RMSEA indeksleri tamamen sağlanırken, GFI ve AGFI neredeyse sağlandı. Bu sonuçlara göre ölçek geçerlidir. Hesaplanan güvenilirlik testi, α = 0,891 veren Cronbach alfa katsayısıdır. Analiz sonuçlarına göre ölçek, faktör yükleri 0.311 ile 0.835 arasında değişen 15 sorudan oluşmaktadır. Ölçeğin 9. ve 12. soruları ters kodlanmış olup, toplam Cronbach Alpha katsayısı 0.891 olarak hesaplanmıştır. Ölçek maddelerinin ayırt ediciliğini belirlemeye yönelik t-testi sonuçları alt% 27 ve üst% 27 grupları arasında anlamlı bir fark olduğunu (p <, 05) ve tüm maddeler yüksek ayırt edici özelliğe sahip olduğunu göstermektedir.

Öneriler: Bu ölçeğin uyarlanmasında bazı hususlara dikkat edilmiş olup, ileride ölçek uyarlama çalışmaları yapacak araştırmacıların da dikkat etmesi gerekmektedir. (1) Ölçek uyarlamadan önce ölçeğin yazarlarından/yazarlarından izin alınmalıdır. (Erkuş,2007;Hambleton ve Patsula,1999). Toplumlar ve bilgi teknolojileri hızla değiştiği için kültürler de buna uyum sağlar. Uyarlanacak ölçeğin hedef kültüre uygun olup olmadığı belirlenmelidir. Kültüre uygun olmayan boyutlar/maddeler ölçeğin yazarına bildirilerek çıkartılabilir (Akbaş ve Kormaz, 2007). Çeviri ve adaya uyarlanmış ölçek kültürel

olarak kabul edilebilir olmalıdır (Çapık, Gözüm ve Aksayan,2018).(2) Her iki kültüre de hakim, nitelikli çevirmenlerin seçilmesi önemlidir (Hambleton ve Patsula, 1999). Ölçek uyarlama çalışmasında kelimesi kelimesine çeviriden ziyade hedef dili konuşanların anlayabileceği bilimsel bir dilde çeviri yapılması esastır.(3) Uyarlanan ölçek için deneme uygulaması yapılmalıdır. Bu uygulamanın niteliği ölçeğin güvenirlik ve geçerliliğini etkileyeceğinden, ölçeğin uygulanacağı ana hedef grupla aynı özelliklere sahip rastgele bir grubun olması uygundur (Erkuş, 2007).

Türkçeye uyarlanan TATICT ölçeği bir tutum ölçeği olduğu için gelecekte ölçeği kullanacak araştırmacıların elde ettikleri verileri mesleki kıdem, cinsiyet, okul türü gibi farklı değişkenlerle ilişkilendirmeleri gerekmektedir. Ayrıca tutum puanının genel olarak düşük olduğu okullarda, olumsuz tutumun yeterlik ile ters orantılı olup olmadığını görmek için bilgisayar yeterlik ölçeği kullanılarak eğitim kurumlarında öğretmen yeterliklerine yönelik çeşitli önlemler alınabilir.

Bu çalışmanın bulgularının bazı sınırlılıklar açısından değerlendirilmesi gerekmektedir. Özellikle dünyayı etkisi altına alan pandemi nedeniyle sınırlı sayıda kişiye ulaşılabilmiş ve anket çalışmaları online olarak yürütülmüştür. Bununla birlikte, farklı örneklemler üzerinde gelecekte yapılacak araştırmalar, araştırma bulgularının genelleştirilmesine katkıda bulunabilir.. Ölçeğe bilgisayar kullanımına dair farklı boyutlar da eklenerek toplam puanlaer hesaplanabilir. Öğretmenlerin demografik özellikleri ile bilgisayara yönelik tutumları arasındaki ilişki açısından değerlendirilerek yeni bir çalışma yapılabilir. Öğretmenlerin bilgisayar yeterlilikleri ile tutum arasındaki ilişki incelenebilir. Bu ölçek anlaşılması açık, güvenilir olması nedeniyle kullanımı kolaydır. Bu bağlamda araştırmanın daha büyük ve farklı örneklemler ile test kullanılarak araştıramalara önayak olması beklenmektedir.