

The development of a scale of attitudes toward tablet pc

Aykut Emre Bozdoğan*

Science Education Department, Giresun University, Giresun, Turkey

Mustafa Uzoğlu

Science Education Department, Giresun University, Giresun, Turkey

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| Article history | The purpose of this study is to develop a reliable and a valid scale to determine the attitudes of the primary students towards tablet pc. The items of the scale were determined by scanning the relevant literature and taking the opinions of the experts. The first draft of the scale including 49 items as a result of content reliability was applied to 434 students chosen randomly from the 7 th and 8 th grades of schools in the city, city centre and the villages of Giresun in March 2012. It was revealed that the scale was clustered on single factor which consisted of 31 items and the factor loading values were 0.470 and over. Cronbach Alpha reliability coefficient was calculated to be 0.93 for the reliability of the scale. |
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INTRODUCTION

Today, the rapid developments in technology result in development of the existing tools or invention of new technological tools. Undoubtedly, computers, one of the most important technological devices which were invented and underwent a change, have been used in every field of life. Computer have become an important part of education from past to present (El-Gayar, Moran & Hawkes, 2011; Serin, 2011; Smith, 2001; Tekbiyik & Akdeniz, 2010; Teo & Lee, 2008). It has been commonly accepted by many researchers that the use of computers in education environments has positive effects on learning and teaching process (Teo, 2008; Wekesa, Wekesa, Mualuko & Julius, 2008). According to Usun (2004) the computers ;

1. are beneficial for individual and learner centred education.
2. offer to study fast and effectively .
3. help to decrease the human mistakes in work fields.
4. help the students to learn easily in the learning process.
5. increases students' motivation.

After the positive effects of the use of computer technology were determined, an increase in the number of computers in education-teaching environments was observed. However, today computers have been replaced by tablet PCs, which are as effective as they are, due to some inconveniences such as their being big and heavy to carry (Ozok, Benson, Chakraborty & Norcio, 2008). A tablet computer, or simply tablet, is a technologic device which is easy to carry and takes a small place and it is the combination of a pocket computer and a laptop computer as a configuration. However, they do not have a keyboard like laptop computer. They have a screen and with their touch screen, any operations can be done (Enriquez, 2010). Tablet computers enable you to write or draw on their screen using digital ink. Moreover, they give opportunities to change and organize the slides composed with Power point (McCabe, 2011). Tablet computers have advantages such as being light, long battery life, being used for general purposes and not being very expensive.

* Correspondence: Giresun University, Faculty of Education, Güre Campus, Giresun, Turkey. E-mail: aykut.emre.bozdogan@giresun.edu.tr, Phone: +90 454 310 12 34.

On the other hand, they have disadvantages such as their problematic battery life, not having CD-rom drive, carrying out the operation slowly and less number of ports (Gill, 2007). Despite their disadvantages, the use of tablet computers in learning environments has just started. The use of tablet computers in learning environments is quite a new process (Fister & McCarty, 2008).

However, the studies carried out with tablet computers in foreign countries revealed that tablet computers, just like the computers, increased student's interest in the lesson, provided motivation towards the lesson and made it easy for the teachers to teach the topic (Derting & Cox, 2008; Gill, 2007; Gorgievski, Stroud, Truxaw & DeFranco, 2005; Le Ber, Lombardo & Quilter, 2008; McCabe, 2011).

Gorgievski *et al.* (2005) used a questionnaire which consisted of 13 items with 103 university students to measure their attitudes towards the use of tablet computers in arithmetic course. As a result of the study, the students stated that tablet computers helped to draw the attention on the material presented in the class, to understand the material better, and offered the teacher to explain the material in an effective way McCabe (2011), who claimed that concept maps and flow charts must be used to teach the abstract concepts and to establish connection between the subjects, determined that concept maps and flow charts would be realized more easily by using tablet computers. Moreover, he stated that the use of tablet computers provided an opportunity for the students to develop a positive attitude towards the course and get an effective educational help. Similarly, Fister & McCarty (2008) stated in their study that tablet computers enriched students' learning environment and the students benefited from the archival resources and the comments of the teachers with tablet computers. Moreover, they added that the use of tablet computers motivated the students for the lesson better. Enriquez (2010) claimed that the use of tablet computer technology with wireless had many benefits. According to Enriquez (2010), tablet computers provided many benefits for the students such as making significant and sudden evaluation for the students about their learning, helping them maximise their learning, and providing necessary feedback. Fister & McCarty (2008) drew attention on two points related to the use of tablet computers by the students to examine and analyse the problems. First, tablet computers provide the students to take the responsibility of their learning. Second, the students feel excited to be in the class because of the tablet computers. Enriquez (2010) determined that the use of tablet computers provided opportunities both for the students and the teachers to analyse the problems, collect data, take notes, and connect electronic class materials and their hand-written notes.

In summary, the studies carried out abroad reveal that the use of tablet computers in class environment has many advantages in terms of teachers and students. This process has just started in our country. It is very early to make predictions about what tablet computers will bring in education. However, it is a known fact that a new technology brought into the class environment will make both the teachers and the students feel uncertain and exciting. Undoubtedly, the implementation of this innovation and its contribution to education rely on the students' attitudes towards this technology.

Attitude which is known to be closely related to the efficiency of teaching means the individual's prevailing tendency to respond favourably or unfavourably to an object, a person or group of people, institutions or events (Aizen, 2005). Attitude is not only concerned about how the individuals see the world but also how they interpret the situation, events and the other people's actions (Fritz, 2008). According to Fritz (2008), it is important to determine the attitudes of the individuals for three reasons. First, attitude affects the individuals' viewpoints, what the individuals are going to say and do. Second, it affects the opinions of the individuals physically and cognitively. Third, it affects how the individuals will be successful in obtaining their goals. Moreover, it is known that developing positive attitude is important for the students' academic

achievement (Kind, Jones & Barmby, 2007). When it is considered that positive and negative attitude towards anything affect the individuals' performances (Fritz, 2008), it is important to develop tablet computer attitude scale in order to determine the students' attitudes towards tablet computers in learning environment. Since the use of tablet computers in education environments is a new phenomenon in our country, a scale is needed to determine the attitudes of the students towards tablet computers. This study is thought to remedy the deficiency. The study which is conducted because of that reason is thought to fulfil this gap and scale attitude towards tablet computers intended to be developed.

METHOD

Stage of Development of the Scale

Firstly, previous studies related to the subject were examined while developing the measurement tools (Derting & Cox, 2008; Enriquez, 2010; Fister & McCarty, 2008; Gill, 2007; Gorgievski, Stroud, Truxaw & DeFranco, 2005; Hirepic, 2011; Le Ber, Lombardo & Quilter, 2008; McCabe, 2011; Uzoğlu & Bozdoğan, 2012).

Then, the stages given below which are generally followed while developing evaluation tools are pursued.

1. Item Writing Stage
2. Stage of Taking the Expert's Opinion
3. Pretesting Stage
4. Stage of Calculating Reliability and Validity (Balçı, 2010; Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2011; Karasar, 2012; Şeker & Gençdoğan, 2006).

Bozdoğan & Öztürk (2008) determined the following order by going through the literature about the developing stages of the scale. This study was conducted by taking into consideration the order determined by Bozdoğan & Öztürk (2008). According to Bozdoğan & Öztürk (2008), the order of the developing stages of the scale is as follows:

1. Stage of Item Pool
 - a. Scanning the Literature
 - b. Examination of previously prepared measurement tools
 - c. Collecting information from the target group to whom the final scale will be applied about the subject (open ended questions, composition and so on).
 - d. Content analysis
 - e. Composing candidate items
 - f. Stage of Expert opinions (Content Reliability)
 - g. Analysis of the candidate items by the experts about whether they measure what is wanted or not, language and design
 - h. Choice of suitable items among the candidate items and creating the draft scale.
2. Pretesting Stage
Implementation of the developed draft scale
3. Stage of calculating reliability and validity
Analysis of data obtained from the draft scale in order to obtain the final scale.
4. Reliability calculations
 - a. Item analysis relying on lower- upper group mean difference
 - b. Item total correlation
 - c. Removal of unsuitable items from the draft by taking into consideration p and r values

5. Reliability calculations (Construct reliability).
 - a. KMO and Barlett's test
 - b. Factor analysis
 1. Analysis of common factor variance values
 2. Analysis of total variance values
 3. Analysis of eigenvalue line graph
 4. Examination of analysis results of basic components of items
6. Reliability calculations
Calculating Cronbach Alpha coefficient
7. Creating the final scale as a result of the analysis done

Stage of Composing the Items

In this stage, literature related to developing scale was scanned (Asante, 2012; Bindak & Çelik, 2006; Teo, 2008; Yurdugül, 2005) and the measurement tools used in the previous studies were examined in order to give guidance about how to develop the scale. While the items in the scale were prepared, such things about items were taken into consideration: the negative and positive items to be expressed in equal numbers, items to be simple and understandable, an item not consisting more than one judgement/ thought/ perception.

Stage of Taking the Expert Opinions

Validity is a concept used to describe the validity of a measurement tool which is considered to be the degree to which the tool measures what it claims to measure. There are three types of validity: content, convergent and construct validity. One or two of the validity types might be suitable according to the features of the measurement tool used in the study. In this stage, the efficiency of the scale developed in terms of content validity was examined. Content validity is realized by taking the opinions of the experts about whether the items in the measurement tools are suitable for the measurement tool and the items represent the field which is to be measured or not. Hence, the goals of measurement and whether these goals represent the required content are discussed by a group of experts (Tyler, 1971; Yurdugül, 2005). The opinions of two science teachers, a computer expert, and a language expert were taken in the study conducted. These experts analysed whether the scale items measured the attitudes towards tablet computer and the grammar and understandability of the items. As a result of the expert opinions, 49 out of 55 items in the pool were found to be suitable and chosen to be used as an attitude expression. Thus, content validity of the measurement tool prepared was tried to be provided.

Pre-testing Stage

49 items made up of 28 positive and 21 negative expressions were made a draft scale for pretesting. The items in the scale were formed in five point Likert scale type and the degree of agreement by the individuals with the items were classified as follows: 1 "I strongly disagree", 2 "I disagree", 3 "Undecided", 4 "I agree", 5 "I strongly agree". For the scoring of the responses by the students, points like 5, 4, 3, 2, 1 used for positive items and points like 1, 2, 3, 4, 5 used for negative items were taken into consideration. The piloting of the draft developed was carried out with 434 students chosen randomly in the 7th and 8th grades of 8 primary schools located in the city centre and the villages of Giresun in March 2012. Karasar (1995) determined that pretesting to be conducted during the development stage of a scale should not consist less than 50 people.

FINDINGS

Reliability Calculation Stage

Reliability comes first before validity in scale development studies. Because scale which is not reliable will not be valid, there is no need to carry out a validity practise (Bindak, 2005). In the stage of calculating reliability, both item analysis relying on lower and upper group mean differences and item analysis relying on correlation were performed in order to test the internal consistency of the scale.

Item Analysis Relying on Lower-Upper Group Mean Differences

t values related to the significance difference between the means of the attitude scores of upper group and lower-group for each item in the scale were calculated to determine the distinctiveness of the items in the scale. Total attitude points were ranged from high to low. Lower and upper groups were made up of 117 people who forms the %27 of all questionnaires. In the analysis, t-test results for item means were presented in Table 1.

Table 1. t-test results for item means of %27 of lower groups and %27 of upper group of the scale

| No | Group | N | \bar{x} | t | p | No | Group | N | \bar{x} | t | p |
|-----|-------|-----|-----------|-------|------|-----|-------|-----|-----------|-------|------|
| M1 | Upper | 117 | 4.98 | 5.537 | .000 | M26 | Upper | 117 | 4.94 | 7.095 | .000 |
| | Lower | 117 | 4.55 | | | | Lower | 117 | 4.07 | | |
| M2 | Upper | 117 | 3.05 | 4.032 | .000 | M27 | Upper | 117 | 4.82 | 15.21 | .000 |
| | Lower | 117 | 2.27 | | | | Lower | 117 | 2.94 | | |
| M3 | Upper | 117 | 4.74 | 6.373 | .000 | M28 | Upper | 117 | 4.91 | 7.678 | .000 |
| | Lower | 117 | 3.96 | | | | Lower | 117 | 4.17 | | |
| M4 | Upper | 117 | 3.29 | 4.758 | .000 | M29 | Upper | 117 | 4.91 | 17.37 | .000 |
| | Lower | 117 | 2.42 | | | | Lower | 117 | 2.84 | | |
| M5 | Upper | 117 | 4.94 | 7.476 | .000 | M30 | Upper | 117 | 4.99 | 9.759 | .000 |
| | Lower | 117 | 4.24 | | | | Lower | 117 | 3.98 | | |
| M6 | Upper | 117 | 4.86 | 8.238 | .000 | M31 | Upper | 117 | 4.73 | 15.26 | .000 |
| | Lower | 117 | 3.76 | | | | Lower | 117 | 2.77 | | |
| M7 | Upper | 117 | 4.63 | 10.30 | .000 | M32 | Upper | 117 | 4.96 | 10.13 | .000 |
| | Lower | 117 | 2.96 | | | | Lower | 117 | 3.72 | | |
| M8 | Upper | 117 | 4.60 | 7.012 | .000 | M33 | Upper | 117 | 4.88 | 11.04 | .000 |
| | Lower | 117 | 3.68 | | | | Lower | 117 | 3.48 | | |
| M9 | Upper | 117 | 4.63 | 11.50 | .000 | M34 | Upper | 117 | 4.96 | 17.82 | .000 |
| | Lower | 117 | 2.94 | | | | Lower | 117 | 2.85 | | |
| M10 | Upper | 117 | 4.68 | 6.848 | .000 | M35 | Upper | 117 | 4.98 | 10.00 | .000 |
| | Lower | 117 | 3.77 | | | | Lower | 117 | 3.74 | | |
| M11 | Upper | 117 | 4.96 | 7.244 | .000 | M36 | Upper | 117 | 5.00 | 10.60 | .000 |
| | Lower | 117 | 4.25 | | | | Lower | 117 | 3.76 | | |
| M12 | Upper | 117 | 4.93 | 13.26 | .000 | M37 | Upper | 117 | 4.97 | 16.43 | .000 |
| | Lower | 117 | 3.32 | | | | Lower | 117 | 2.96 | | |
| M13 | Upper | 117 | 4.92 | 9.972 | .000 | M38 | Upper | 117 | 5.00 | 11.66 | .000 |
| | Lower | 117 | 3.58 | | | | Lower | 117 | 3.53 | | |
| M14 | Upper | 117 | 4.93 | 12.83 | .000 | M39 | Upper | 117 | 4.92 | 17.26 | .000 |
| | Lower | 117 | 3.43 | | | | Lower | 117 | 2.85 | | |
| M15 | Upper | 117 | 4.80 | 9.257 | .000 | M40 | Upper | 117 | 4.87 | 15.87 | .000 |
| | Lower | 117 | 3.56 | | | | Lower | 117 | 2.83 | | |
| M16 | Upper | 117 | 4.81 | 12.99 | .000 | M41 | Upper | 117 | 4.98 | 10.29 | .000 |
| | Lower | 117 | 3.11 | | | | Lower | 117 | 3.83 | | |
| M17 | Upper | 117 | 4.64 | 9.359 | .000 | M42 | Upper | 117 | 4.94 | 10.33 | .000 |
| | Lower | 117 | 3.24 | | | | Lower | 117 | 3.62 | | |
| M18 | Upper | 117 | 4.93 | 12.14 | .000 | M43 | Upper | 117 | 4.94 | 12.79 | .000 |
| | Lower | 117 | 3.59 | | | | Lower | 117 | 3.29 | | |
| M19 | Upper | 117 | 4.95 | 9.546 | .000 | M44 | Upper | 117 | 4.92 | 7.626 | .000 |

| | | | | | | | | | | | |
|------------|-------|-----|------|-------|------|------------|-------|-----|------|-------|------|
| | Lower | 117 | 3.83 | | | | Lower | 117 | 3.98 | | |
| M20 | Upper | 117 | 4.90 | 11.63 | .000 | M45 | Upper | 117 | 4.74 | 7.774 | .000 |
| | Lower | 117 | 3.18 | | | | Lower | 117 | 3.65 | | |
| M21 | Upper | 117 | 4.97 | 8.438 | .000 | M46 | Upper | 117 | 4.78 | 15.62 | .000 |
| | Lower | 117 | 4.11 | | | | Lower | 117 | 2.70 | | |
| M22 | Upper | 117 | 4.94 | 8.037 | .000 | M47 | Upper | 117 | 4.88 | 8.537 | .000 |
| | Lower | 117 | 4.03 | | | | Lower | 117 | 3.87 | | |
| M23 | Upper | 117 | 4.92 | 13.76 | .000 | M48 | Upper | 117 | 4.99 | 10.75 | .000 |
| | Lower | 117 | 3.23 | | | | Lower | 117 | 3.85 | | |
| M24 | Upper | 117 | 4.94 | 10.25 | .000 | M49 | Upper | 117 | 4.94 | 9.921 | .000 |
| | Lower | 117 | 3.67 | | | | Lower | 117 | 3.63 | | |
| M25 | Upper | 117 | 4.65 | 12.48 | .000 | Mt | Upper | 117 | 4.83 | 39.29 | .000 |
| | Lower | 117 | 2.63 | | | | Lower | 117 | 3.46 | | |

Item Total Correlation

The item distinctiveness of 49 items in the scale, in other words, item total correlation was assessed. Correlations between the scores belonging to the items and the total score of the scale were presented in Table 2.

Table 2. Item Analysis Results of the Scale

| Item number | Item Total Correlation* | Item Number | Item Total Correlation* | Item Number | Item Total Correlation* |
|-------------|-------------------------|-------------|-------------------------|-------------|-------------------------|
| M1 | .508 | M18 | .644 | M34 | .766 |
| M2 | .286** | M19 | .642 | M35 | .627 |
| M3 | .504 | M20 | .670 | M36 | .610 |
| M4 | .321** | M21 | .619 | M37 | .735 |
| M5 | .555 | M22 | .580 | M38 | .627 |
| M6 | .582 | M23 | .683 | M39 | .697 |
| M7 | .545 | M24 | .616 | M40 | .704 |
| M8 | .489 | M25 | .623 | M41 | .636 |
| M9 | .626 | M26 | .492 | M42 | .555 |
| M10 | .480 | M27 | .742 | M43 | .658 |
| M11 | .548 | M28 | .518 | M44 | .549 |
| M12 | .705 | M29 | .756 | M45 | .499 |
| M13 | .591 | M30 | .665 | M46 | .679 |
| M14 | .647 | M31 | .687 | M47 | .556 |
| M15 | .593 | M32 | .675 | M48 | .670 |
| M16 | .657 | M33 | .657 | M49 | .605 |
| M17 | .581 | | | | |

* n = 434, p < 0.01 significant values for
 ** Substances removed from the scale

As a result of item analysis, items of the scale were calculated by using the item total correlation. Item total correlation coefficient is a very good item for $r \geq 0.40$ and a good item for $0.30 \leq r \leq 0.39$ (Büyüköztürk, 2002, 2003a). t-values of the scale developed in the study are significant and item total correlation for all the items change between 0.286-0.766. After the 2nd and the 4th items were removed from the scale in this context, it can be stated that the items of the scale are intended to measure very good, distinctive, with high reliability and similar attitudes.

Validity Calculation Stage

In this stage of the study, the construct validity of the study was examined. Kaiser-Mayer-Olkin (KMO) and Barlett’s test which are prerequisite for factor analysis were done and the results were given in Table 3.

Table 3. Kaiser-Mayer-Olkin (KMO) Sampling and Barlett's Test Results of the Scale

| | | | |
|---|---------|----------|------------|
| Kaiser-Mayer-Olkin (KMO) Measure of Sampling Adequacy = | 0,942 | | |
| Barlett's Test Approximate Chi-square value = | 5,566E3 | sd = 465 | p = 0.000* |

*p<0.001

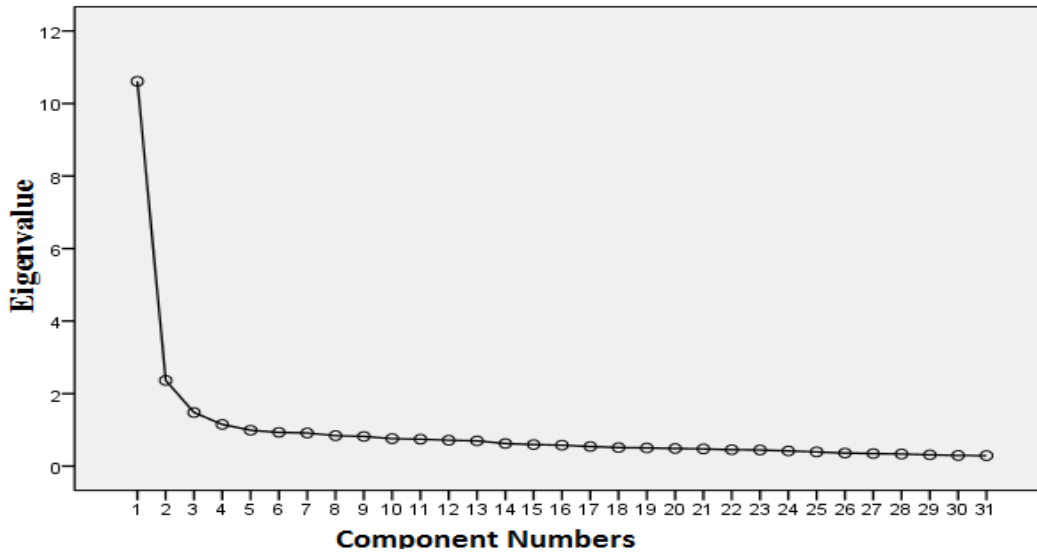
Kaiser-Mayer-Olkin (KMO) is a quantity related to the suitability of the correlation between the sampling and the items of the scale. If Kaiser-Mayer-Olkin (KMO) values are over 0.60, they include values which are acceptable. High Kaiser-Mayer-Olkin (KMO) values will cause Barlett values to be high. If both of them have high values, it will reveal the suitability of factor analysis and high correlation values between the items (Şeker, Deniz & Görge, 2004). It was determined that the Kaiser-Mayer-Olkin (KMO) value of the scale was 0.942 and Barlett's test significance value was $p < 0.001$. The values obtained reveal the suitability of factor analysis and the significant correlation between the items.

As a result of factor analysis, the items with number 3, 7., 8., 10., 11., 13., 15., 17., 24., 25., 26., 28., 42., 44., 45. and 47. in the attitude scale whose common factor variances were low were removed from the scale and they were collected under single factor. Communality of the remaining items in the attitude scale were given in the Table below.

Table 4. Communality of the Items in the Scale

| Items | Communality | Items | Communality | Items | Communality |
|-------|-------------|-------|-------------|-------|-------------|
| M34 | .698 | M14 | .622 | M49 | .557 |
| M23 | .659 | M43 | .603 | M41 | .555 |
| M27 | .655 | M48 | .598 | M9 | .555 |
| M40 | .647 | M30 | .593 | M19 | .550 |
| M29 | .638 | M18 | .592 | M35 | .543 |
| M39 | .638 | M33 | .574 | M22 | .527 |
| M37 | .638 | M20 | .574 | M38 | .510 |
| M32 | .636 | M16 | .567 | M5 | .495 |
| M12 | .630 | M21 | .566 | M36 | .493 |
| M31 | .625 | M46 | .561 | M6 | .483 |
| | | | | M1 | .470 |

As a result of factor analysis, factor loading values of the items have great importance. Büyüköztürk (2002, 2003a) determines that factor loading values of the items which are 0.45 and over are the indicators of a good result. It was found that common factor variances of the items in the scale changed between 0.470-0.698. According to these results, it can be stated that common factor variances of the items were high values. When the total variance values of the items in the scale were analysed, the variance is %34.23 on condition that the items taken for analysis are clustered under single factor. Moreover, when the graph drawn according to eigenvalue was analysed, a fast drop after the first factor on the eigenvalue line was determined. This situation revealed that the scale might have a factor in general terms.



Graph 1.Line Graph belonging to Eigenvalues of the Items in the Scale

Variance which is %30 or more is sufficient in single factor scales (Büyüköztürk, 2003b) and total variance shown by a single factor which makes up the scale is % 34,23. Finally, in the analysis for the reliability of the scale, Cronbach Alpha reliability coefficient was found to be $\alpha = 0.93$.

RESULTS AND SUGGESTIONS

Attitude scale for tablet computers which consisted of 49 items were applied to 434 students and a final scale made up of 31 items were composed. KMO value for 31 items is 0.942 and Bartlett's test significance value is $p < 0.001$. This value corresponds to "very good" categorization (Field, 2002). Therefore, it can be stated that factor analysis conducted on these data offered reliable results. When total variance values of the items in the scale were analysed, it was revealed that 31 items were clustered under single factor and the variance of this factor about the scale was %34.23. A fast drop on eigenvalue line after the first factor was determined in the line graph drawn according to eigenvalue. This situation revealed that the scale might have a factor in general terms.

Moreover, it was found that factor loading values of the items in the test were 0,470 and over. This value provides the factor loading criteria of the item to be included in the measurement tool estimated by Büyüköztürk (2005). Cronbach Alpha reliability coefficient was found to be $\alpha = 0.93$ for the reliability of the scale. This value is close to 1. According to Karasar (2012), the reliability coefficient's being close to 1 is good and adequate for the measurement tool. As a result of the analysis, the significant difference between lower and upper groups proves that t values are significant and the scale is reliable due to high item total correlations.

The data obtained from this study revealed that the scale developed could be used to measure the attitudes towards tablet computers. Thus, this study is a step taken to determine the attitudes towards tablet computers more healthfully. Studies conducted to enhance the students' attitude levels towards tablet computers might be conducted with the data obtained about the use of this scale.

REFERENCES

Asante, K.O. (2012). Secondary students' attitudes towards mathematics. *Ife Psychologia*; 20(1), 121-133.

- Aizen, I. (2005). Attitudes, Personality and Behaviour. [<http://site.ebrary.com/lib/Giresun/Doc?id=10161279&ppg=16>] adresinden 06.01.2012 tarihinde edinilmiştir.
- Balcı, A. (2010). *Sosyal Bilimlerde Araştırma Yöntem, Teknik ve İlkeleri*. Pegema Yayınevi: Ankara.
- Bindak, R. (2005). Tutum ölçeklerine madde seçmede kullanılan tekniklerin karşılaştırılması. *İnönü Üniversitesi Eğitim Fakültesi Dergisi*. 6 (10), 17-26.
- Bindak, R., & Çelik, H.Ç. (2006). Öğretmenler için tutum ölçeğinin güvenirlik ve geçerlik çalışması. *Eğitim Araştırmaları*, 22, 38-47.
- Bozdoğan, A.E., Öztürk, Ç. (2008). Coğrafya ile ilişkili fen konularının öğretimine yönelik öz-yeterlilik inanç ölçeğinin geliştirilmesi. *Necatibey Eğitim Fakültesi Elektronik Fen Ve Matematik Eğitimi Dergisi*. 2 (2), 66-81.
- Büyüköztürk, Ş. (2002). *Faktör analizi: Temel kavramlar ve ölçek geliştirmede kullanımı*. Kuram ve Uygulamada Eğitim Yönetimi. 32, 470-483.
- Büyüköztürk, Ş. (2003a). Eğitim istatistiği yüksek lisans ders notları. Ankara Üniversitesi Eğitim Bilimleri Enstitüsü. Ankara.
- Büyüköztürk, Ş. (2003b). *Sosyal Bilimler İçin Veri Analizi El Kitabı*. Pegema Yayıncılık, Ankara.
- Büyüköztürk (2005). *Sosyal Bilimler İçin Veri Analizi El Kitabı (5. Baskı)*. PegemA Yayıncılık, Ankara.
- Büyüköztürk, Ş., Çakmak, E.K., Akgün, Ö.E., Karadeniz, Ş. & Demirel, F. (2011). *Bilimsel Araştırma Yöntemleri (10. Baskı)*. Pegem A Yayıncılık, Ankara.
- [Derting, T. L.](#) & [Cox, J.R.](#) (2008). Using a tablet pc to enhance student engagement and learning in an introductory organic chemistry course. *Journal of Chemical Education*. 85(12), 1638-1643.
- El-Gayar, O., Moran, M., & Hawkes, M. (2011). Students' acceptance of tablet PCs and implications for educational institutions. *Educational Technology & Society*, 14 (2), 58–70.
- Enriquez, A.G. (2010). Enhancing student performance using tablet computers. *College Teaching*, 58, 77-84.
- Field, A. (2002). *Discovering Statistics Using SPSS*. Sage Publications Ltd., UK: London.
- Fister, K. R., & McCarty, M.L. (2008). Mathematics instruction and the tablet PC. *International Journal of Mathematical Education in Science and Technology*, 39 (3), 285–292.
- Fritz, R. (2008). Power of a positive attitude: Discovering the key to success. [<http://site.ebrary.com/lib/giresun/Doc?id=1027181&ppg=8>] adresinden 06.01.2012 tarihinde edinilmiştir.
- Gill, T.G. (2007). Using the tablet PC for instruction. *Decision Sciences Journal of Innovative Education*. 5(1), 183-190.
- Gorgievski, N., Stroud, R., Truxaw, M., & DeFranco, T. (2005). Tablet pc: A preliminary report on a tool for teaching calculus. *International Journal for Technology in Mathematics Education*, 12 (3), 95-102.
- Karasar, N. (1995). *Bilimsel Araştırma Yöntemi: Kavramlar, İlkeler ve Teknikler*. Ankara: 3A Araştırma Eğitim Danışmanlık Ltd. Şti.
- Karasar, N. (2012). *Bilimsel Araştırma Yöntemi*. Nobel Yayıncılık. Ankara.
- Kind, P., Jones, K. & Barmby, P. (2007). Developing attitudes towards science measures. *International Journal of Science Education*. 29 (7), 871-893.
- Le Ber, J. M., Lombardo, N.T. & Quilter, J. (2008). Tablet pc use enhances teaching and student learning. *Journal of Electronic Resources in Medical Libraries*, 5(1), 17-31.
- McCabe, B. (2011). An integrated approach to the use of complementary visual learning tools in an undergraduate microbiology class. *Journal of Biological Education*, 45 (4), 236-243.
- Ozok, A.A., Benson, D., Chakraborty, J. & Norcio, A.F. (2008). A comparative study between tablet and laptop pcs: user satisfaction and preferences. *Intl. Journal Of Human-Computer Interaction*, 24(3), 329–352.

- Serin, O. (2011). The effects of the computer-based instruction on the achievement and problem solving skills. *The Turkish Online Journal of Educational Technology*, 10 (1), 183-201.
- Smith, S.D. (2001). Relationship of computer attitudes to sex, grade level and teacher influence. *Education*, 106 (3), 338-344.
- Şeker, H., Deniz, S., Görge, İ. (2004). Öğretmen yeterlikleri ölçeđi. *Milli Eğitim Dergisi*. 164, 105-118.
- Şeker, H. & Gençdoğan, B. (2006). *Psikolojide ve Eğitimde Ölçme Aracı Geliştirme*. Nobel Yayınları, Ankara.
- Tekbıyık, A., & Akdeniz, A.R. (2010). A meta-analytical investigation of the influence of computer assisted instruction on achievement in science. *Asia-Pacific Forum on Science Learning and Teaching*, 11(2),
- Teo, T. (2008). Pre-service teachers' attitudes towards computer use: A Singapore survey. *Australasian Journal of Educational Technology*, 24(4), 413-424.
- Teo, T. & Lee, C.B. (2008). Attitudes towards computers among students in higher education: A case study in Singapore. *British Journal of Educational Technology*, 39(1), 160-162.
- Tyler, L.E. (1971). Tests and measurements. Englewood Cliffs. Prentice-Hall. N. J.
- Usun, S. (2004). Undergraduate students attitudes on the use of computers in education. *The Turkish Online Journal of Educational Technology*, 3(2), 62-70.
- Uzoglu, M. & Bozdogan, A.E. (2012). An examination of preservice science teachers' views related to use of tablet pcs in science and technology course in terms of different variables. *Mevlana International Journal of Education (MIJE)*. 2(1), 1-14.
- Wekesa, D. W., Wekesa, E.W., Mualuko, N.J. & Julius, M. (2008). Students' reactions to the use of computers in science education in selected kenyan secondary schools. *Problems of Education in the 21st Century*. 9, 107-114.
- Yurdugöl, H. (2005). Ölçek geliştirme çalışmalarında kapsam geçerliđi için kapsam geçerlik indekslerinin kullanılması. XIV. Ulusal Eğitim Bilimleri Kongresi Pamukkale Üniversitesi Eğitim Fakültesi, 28-30 Eylül 1-5.

Ek 1. TABLET BİLGİSAYAR TUTUM ÖLÇEĞİ

| | | |
|----|-----------------|--|
| 1 | Madde 1 | Derslerimde tablet bilgisayar kullanmak isterim. |
| 2 | Madde 5 | Derslerin tablet bilgisayar ile yapılmasından mutlu olurum. |
| 3 | Madde 6 | Evde tablet bilgisayar ile çalışırsam, derslerime olan motivasyonum artar. |
| 4 | Madde 9 | Tablet bilgisayar başında geçirdiğim zamanları boşa geçirmiş sayarım. |
| 5 | Madde 12 | Ev ödevlerimde tablet bilgisayar kullanmak benim için sıkıcı bir iştir. |
| 6 | Madde 14 | Tablet bilgisayarı her kullanmak istediğimde moralim bozulur. |
| 7 | Madde 16 | Tablet bilgisayar ile çalışmak zor bir iştir. |
| 8 | Madde 18 | Tablet bilgisayarla araştırma yapmak sıkıcıdır. |
| 9 | Madde 19 | Tablet bilgisayarın derslerde kullanılan değerli bir araç olduğunu düşünürüm. |
| 10 | Madde 20 | Derslerimde tablet bilgisayar kullanmak istemem. |
| 11 | Madde 21 | Tablet bilgisayarın derslerimi daha iyi anlamamı sağlayacağını bilmek hoşuma gider. |
| 12 | Madde 22 | Ders kitaplarındaki bilgileri tablet bilgisayarlarda görmek güzel bir duygudur. |
| 13 | Madde 23 | Tablet bilgisayarlar ile ders yaparak bir şeyler öğrenmek zaman kaybıdır. |
| 14 | Madde 27 | Derslerde tablet bilgisayarlar kullanılınca kafam karışır. |
| 15 | Madde 29 | Derslerimizi tablet bilgisayarlarla yapmak bana hiç çekici gelmiyor. |
| 16 | Madde 30 | Tablet bilgisayar yardımıyla öğrenmek çok zevklidir. |
| 17 | Madde 31 | Tablet bilgisayar ile ders çalışmayı düşündüğümde endişelenirim. |
| 18 | Madde 32 | Derslerimde tablet bilgisayarı kullanarak konuları öğrenebileceğimi bilmek beni mutlu eder. |
| 19 | Madde 33 | Tablet bilgisayar derslerde zengin bir öğrenme ortamı sağlar. |
| 20 | Madde 34 | Tablet bilgisayarla yapılan dersi dinlemek hiç içimden gelmez. |
| 21 | Madde 35 | Tablet bilgisayar bir konuyu öğrenmek için bana çok çeşitli fırsatlar sunar. |
| 22 | Madde 36 | Tablet bilgisayardaki konu ile ilgili resimler dersleri daha eğlenceli hale getirir. |
| 23 | Madde 37 | Seçme şansı verilse tablet bilgisayarı derslerimde hiç kullanmak istemem. |
| 24 | Madde 38 | Tablet bilgisayardaki konu ile ilgili animasyonlar dersleri daha eğlenceli hale getirir. |
| 25 | Madde 39 | Tablet bilgisayar ile ödevlerimi yapmak beni korkutur. |
| 26 | Madde 40 | Derslerde tablet bilgisayar kullanılması kendimi mutsuz hissetmeme neden olur. |
| 27 | Madde 41 | Tablet bilgisayardaki uygulamalarla dersi daha iyi öğreneceğimi bilmek beni mutlu eder. |
| 28 | Madde 43 | Tablet bilgisayar ile ders çalışırken sinirli olurum. |
| 29 | Madde 46 | Tablet bilgisayar ile ders işlendiğinde konuları anlayamayacağım korkusuna kapılırım. |
| 30 | Madde 48 | Tablet bilgisayar ile bir konuyu tekrar etmek eğlenceli bir iştir. |
| 31 | Madde 49 | Derslerde tablet bilgisayarı görünce içimden tablet bilgisayarı parçalamak geçer. |