Journal of Universal Computer Science, vol. 22, no. 1 (2016), 82-93
submitted: 30/6/15, accepted: 20/12/15, appeared: 1/1/16 © J.UCS

Validity and Reliability of Tablet Supported Education Attitude and Usability Scale

Huseyin Uzunboylu
(Near East University, Nicosia, Cyprus
huseyin.uzunboylu@neu.edu.tr)

Vasfi Tugun
(Near East University, Nicosia, Cyprus
vasfi.tugun@neu.edu.tr)

Abstract: The use of mobile technologies in education has begun due to the increase in the use of mobile technologies. The attitudes of students, teachers and parents towards mobile learning and their opinions about the usability of mobile learning should be received in order to achieve mobile supported education in the schools. The aim of this study is to develop a scale about the attitudes of students in a private college towards usability of mobile supported education. This study was conducted with 150 students. Firstly, the students wrote composition about the issue, made a literature search and the statements were prepared and presented to expert opinion. The last version of the data collection tool was administered to 150 students and necessary analysis was made. Based on the obtained results, the scale was decided to have two dimensions. Besides, the results showed that the reliability and validity of the scale is high. Recommendations for future research were also provided.

Keywords: Tablet supported learning, mobile learning, validity, reliability
Categories: K.3.1, L.1.2, L.2.0, L.2.1, L.2.2, L.2.5, L.2.7, L.3.0, L.3.1, L.3.2, L.3.4, L.3.5, L.3.6, L.3.8

1 Introduction

Technological developments in today's world is developing rapidly, due to these developments in today's world its ability to place new and current technologies in teaching, use of technology in education materials are needed. According to [Keser, 05] the most prominent feature of the 21st century is the rapid changes in computer and communication technologies and development of individuals, institutions, communities, which are briefly affecting the whole world. Especially in the last ten years till today's technology have witnessed rapid developments in the field of education [Boukas, Kambourakis, & Gritzalis, 09]; [Ozdamli, & Uzunboylu, 14]; [Sharples, 00]; [Uzunboylu, Bicen, & Cavus, 11]; [Wurst, Smarkola, & Gaffney, 08]. In this context, systems that are being implemented in school's education become mandatory to amendments. The main objective of this process; rather than having individuals loaded with memorization learning based education, we should have free, creative, explorer and scientific thinking, questioning events, beholding the solution of problems to educate individuals capable of producing [Kapoun, Faculty, Šrámka, & Mariánské, 14]; [Yavuz, & Coşkun, 08]. This technological advances and new technological products had its reflection in education by effective communication and

personal computers as a teaching tool in teaching-learning process [Bicen, & Uzunboylu, 13]; [Güven, & Sülün, 12]; [Ozdamli, 13]. The integration of technology has become inevitable since the usability of information technology had widespread in society and after beginning to use it with the educational environment [Akkoyunlu, 96]. Educational environment that appeals to multiple senses are known as easily and permanently facts that are held in effective learning events [Çepni, & Akyıldız, 10]. With the increasing use of computers for education, teachers moved away from the traditional methods, a lot of universities have started to implement in web-based courses, educational use of mobile technology and wireless technology began to be called [Bicen, Ozdamli, & Uzunboylu, 12]; [Cavus, 10]; [Markett, Sánchez, Weber, & Tangney, 06]; [Motiwalla, 07]; [Rau, Gao, & Wu, 08]; [Simsekli, 14]. During the recent years from number of surveys assumed that the use of technology in the classroom has left positive impact on students, interesting in learning the desire course, help them learn knowledge and skills, increase the students motivation, and focused on teachers and students a rich educational environment [Aksal, 11]; [Delen, & Bulut, 11]; [Gündüz, 10]; [Güzel, 11]; [Kenar, 12]; [Keser, Uzunboylu, & Ozdamli, 11]. Students to understand the evolving technology, to use the technology, to keep pace with innovation, the provision of courses in terms of line with technological developments are expected to be useful.

Tablet computer is a portable computer with the generic name. Being stronger than a modern computer and the screen size may vary according to the types. Tablet computers, allows users to easily move data and offers storage, but today is known as an indispensable communication tool. A mobile technology of the information society offers excellent features for students and educators [Bicen, & Arnavut, 15]; [Uzunboylu, & Ozdamli, 06]; [Uzunboylu, & Ozdamli, 11]; [Ozdamli, & Uzunboylu, 14]. In the year of 2010 within the light of this project, Turkey carried out a project called FATIH project which was basically a tablet supported computers. Tablet computers allow students to prepare their work, presentations, and let them store their work and chance to repeat their work whenever they want. In light of all these projects in Turkey in 2010 under the name of FATIH, tablet computer aided education has been started. FATIH project, aimed to provide equality of opportunity in the field education and training and to develop the information technology education in the schools of primary education and secondary education in the Republic of Turkey, information technology tools teaching-learning process more senses to be able to appeal, for effective use in lessons; preschool, elementary and secondary level schools total of 570.000 classrooms is provided with LCD Panel IWB and internet network infrastructure [MEB, 14]. Researchers conducted [Kurt, Kuzu, Dursun, Güllüpınar, & Gültekin] in 2013 based on their findings from focus group interviews with teacher's shows us that FATIH project largely has positive impact on socialization and a sense of responsibility on students. [Akinci, Kurtoğlu & Seferoglu] in 2012, argue that in order to make FATIH project successful it needs to be a successful professional in-service training, which is a prerequisite for success in the major approaches and project in teacher training institutions co-operation must be necessary. On the other hand, many studies have been made within FATIH project. This study has been observed in 2014 when [Çetinkaya, & Keser] work titled of Problems and Solutions teachers and students face when using Tablet computers, teachers that work in the secondary schools, and students studying in these institutions

encountered problems during the use of tablet computers and suggestions for solutions to these problems were aimed to determine, and the most important problem stated was that the use of tablet computers for out of purposes for teachers and students.

In the light of all these developments and research were aim to develop this attitude scale. Researchers conducted survey in both Turkey and Cyprus for the tablet supported education, students' attitudes shed light on this scale for research is of great importance. Research done by [Uzunboylu, & Ozdamli] in 2011 shows us the reason why this project was done, because perceptions of teachers and students to learn how to use tablet computers was higher and tablets had higher use in education were expected to begin. So, the purpose of this study is to determine student's attitudes towards tablet aided education studying at secondary education level and to develop the availability of valid and reliable for Liker-type scale.

2 Method

This research constitute in Northern Cyprus Ministry of Education in Secondary Education in a private college with 319 students who are learning in class 6 and 9 (160 females, 159 males). The reason why 6th and 9th grade students participated in this study is because tablet education is given as a pilot application to those two classes. 319 students that participated in tablet classes had an odd number in their last digit of their school number. In this study using stratified random sampling method was used to determine sampling. Stratified random sampling is a process in which certain sub groups are selected for the sample in the same proportion as they exist in the population [Fraenkel, Wallen, & Hyun 2006]. For this study, we decided to have a sample made up of %50 of the target population. Data for the tests of reliability and validity were obtained from a sample of 160 students from 8 classes. The return rate 93.7% and 150 useable questionnaires were available for analysis. A total of 150 students participated in the study, 57% of girls (n = 86), 43% are male. Student's ages ranged from 11 to 15. The average age is 13.

3 Development of Scale

Students studying in tablet supported secondary education (TSE) have attitudes towards tablet aided education and scaling tool must be used to determine its usability in courses. For this purpose, the scale of the tablets when creating materials for educational use and the related literature for mobile learning content screening and analysis made in the written statement is 23. Tablets prepared for the scale-aided education, examined by language experts and language mistakes that do not conform to the rules have been corrected. Faculty members of 10 workers in the university which are experts in the field were consulted to the scope of the scale and validity of the outlook. In accordance with the opinion of experts that the first expression is not appropriate on the grounds therefore it is excluded from the scale, necessary corrections were made for the students attitudes towards learning tablet assisted data collection tool which was developed to determine the end of the trial form. Such things as group size factor analysis, item analysis taking into account the number of

subject is recommended to be at least twice [Büyüköztürk, 05]; [Kline, 94]. Data collection can be made of the validity and reliability analysis prepared for the data collection tool that was applied to 150 students as a group of pre-trial studying in the College 6th and 9th grade students. The 5 point Liker-type material is preferred for the survey responses. They requested from the participants to classify each category located on the scale by marking strongly disagree - disagree - undecided - agree – and strongly agree. In order to obtain the total score for each participant, collected responses were scored from 1-5, 5 points to the most important category and 1 point for the most negative category. Scale will form the substance in question in order to determine pre-trial on the data obtained from students, the arithmetic average of each item, and the item-total correlations and standard deviations were calculated. Selection of items in scale item-total correlation coefficient is .30 which criterions are based on the value. Items in the scale are approximately 2.94-4.20, while the standard deviation is between 1:23 to 1:48. In order to evaluate the distinctiveness of items contained in the scale of the examination results of the item analysis and item-total correlations are .30's the 5 items that was found to be below were removed. The reliability coefficient in all the Cronbach's was found $\alpha = .953$. It has emerged that as a result of pre-trial materials to be understood, changes in the expression of several items were needed. By doing the essential changes of the data collection tool has given its final shape. Given the shape of the front-end tools for trial before applying the tools of data collection tool to the front of the tablet containing the education with the necessary explanations is given. The researchers obtained permission from the director of College after data collection tools identify school grades stratified by sampling an odd number of students who were administered.

4 Result

Our research provided the first findings about students' attitudes towards tablet supported learning in Cyprus. Students' attitudes towards the use of the tablet scale was developed for determining the data entered into SPSS 20 program after the distribution of total scores were analyzed. There were total of 17 expressions on the scale with minimum 17, maximum 85 points that can be taken, width (range) obtained the lowest score of 68 on the scale of 17, and the highest score was 85. Width was found to be 68. Scale was average of 59.08, the middle one was 63 and standard deviation was calculated to be 1.69. Coefficient of skewness in the analysis – was .725, and kurtosis coefficient was .752. These findings obtained from the student data shows that they have normal range. To determine structure validity of scale, factor analyses were made.

Also the number of data samples to measure compliance based on factor analysis, KMO and Barlett 'tests were made. The suitability of the data for factor analysis has to be higher than KMO .60 and Bartlett's test has to be meaningful [Büyüköztürk, 04].

Statistics		
N	Valid	150
	Missing	0
Mean		59.0867
Median		63.0000
Std. Deviation		1.69321
Minimum		17.00
Maximum		85.00
Range		68.00
Skewness		-.725
Kurtosis		.752

Table 1: Students' attitudes towards tablet supported education and its usability.

In the study sample, KMO coefficient of concordance was calculated as .931. If KMO test values found in under 0.50's it is worth unacceptable, 0.50 poor, 0.60 moderate, and 0.70 good, 0.80 good, and 0.90 is perfect [Sharma, 96].

Kaiser-Meyer-Olkin Measure of sampling adequacy		.931
Bartlestt's Test of Sphericity	Approx. Chi-squate	1.955
	df	136
	Sig.	.000

Table 2: KMO and Bartlett's Test

	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% Var.	Cum. %	Total	% Var.	Cum. %	Total	% Var.	Cum. %
1	9.80	57.66	57.66	9.80	57.66	57.66	5.83	34.32	34.32
2	1.16	6.871	64.53	1.16	6.87	64.53	5.13	30.21	64.53
3	.84	4.973	69.50						
.									
17	.13	.766	100.0						

Table 3: Results of factor analysis total variance explained

Principal component and varimax rotation was applied to reveal their sub-dimensions of the scale factor analysis. Varimax rotation in determining the scale-forming substances after the analysis of the load factor of at least 0.40, and by the only factor positioned below are considered. This value is not the same in all the

literature and it may vary. Generally, values of .30 and .40 are taken as the limit value [Gürbüztürk, & Şad, 10]; [Johnson, & McClure, 04]; [Tsai, & Liu, 05]. 2 factors were found in student's attitudes towards iPad supported education and usability of the scale. A total of variance by a factor of 2 species was 64.53%. Since it is difficult to reach higher values in social sciences, the variance percentage over 40 - 60 is considered acceptable in various resources [Namlu, & Odabasi, 07]. Percentages after two factors obtained from variance after Varimax rotation was calculated as; for the first factor 57.66% and 6.87% for the second factor and two-dimensional variance percentages after varimax rotation are 34.32% and 30.21%. When examining the factor weights ranged from .814 to .560. The scale consists of basically two dimensions. Accordingly, the sub-dimensions "Students' Attitudes towards Tablet Computer Aided Education" (8 items) and " Usability of the Tablet Assisted Education (9 items) has been named. As shown in Figure 1 as a result of factor analysis to see the relationship of the size scale of the Pearson correlation coefficient was calculated and was found to be a strong relationship between the two dimensions. In this context, it can be said that regarding the total points examined from correlations, the scale is measuring the desired properties that needs to be measured.

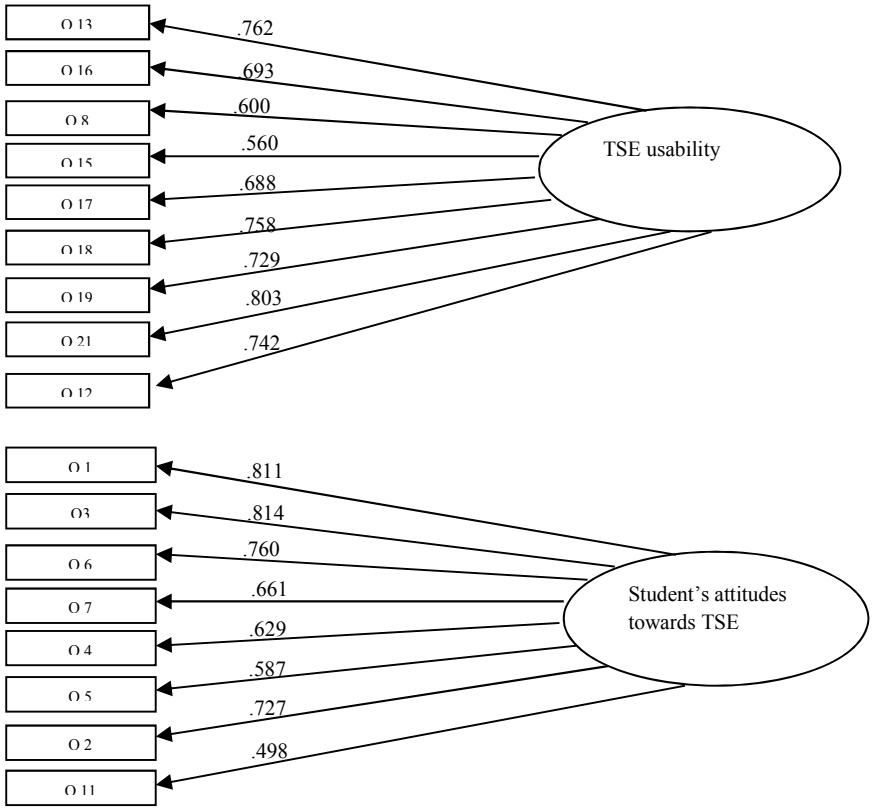

Figure 1: Student's attitudes towards tablet supported education and its usability factor

Items and Factors	Mean	SD	Item Total	Comp. factor load	Vari. Load
Factor I: Student's attitudes towards tablet supported education α=.921, Half-split reliability= .891					
1- In the course of the use of tablet computers allow us to remember information better.	3.10	.103	.727	.764	.811
3- Tablet computers must be used in all classes.	3.42	.102	.751	.784	.814
6-The Use of tablet computers in the course keep curiosity alive.	3.35	.111	.695	.735	.760
7- The use of tablet computers in the course increases the motivation.	3.32	.110	.730	.766	.661
4- The use of tablet computers in class and outside of class increases interaction.	3.62	.106	.756	.789	.629
5- Through the use of tablet computers in courses gives you the opportunity to learn along with my friends.	3.65	.102	.741	.775	.587
2- Education enhances productivity with tablet computers.	3.59	.101	.624	.668	.727
11- It feels more comfortable asking questions during courses that performed with tablet computer.	3.10	.105	.800	.830	.498
Factor I Total	**3.69**	**0.8**			
Factor II: Tablet supported educations usability α=.920 Half-split reliability=.891					
13- I will never forget the information I learned from tablet PCs that appeal to visual learning and training.	3.48	.106	.759	*.792*	.762
16-I can learn the subjects that I missed since courses are recorded in the video.	3.04	.106	.790	.820	.693
8- Thanks to e-books I do not have to carry my books.	3.60	.114	.710	.745	.600
15- Materials are easier to share.	2.94	.120	.599	.641	.560
17- Projects / assignments can be managed with tablets.	4.20	.093	.628	.671	.688
18- Thanks to the Tablet PC application it allows us to take notes in class.	3.66	.108	.798	.827	.758
19- Tablet PC application provides more performance in the exam.	3.55	.112	.741	.778	.729
21- It is easier to keep notes on a tablet computer.	3.49	.114	.743	.779	.803
12- Tablet PC application in the course of the interaction increases the virtual classroom applications.	3.93	.103	.672	.712	.727
Factor II Total	**3.54**	**0.8**			

Table 4: Student's attitudes towards tablet supported education and its usability factor and reliability results.

To determine whether the scale is reliable or not the whole scale and reliability of subscale for Cronbach's α and split-half reliability is used. This coefficient (α) is a general form of the KR20 formula to be used in calculating the reliability of items that are not scored right versus wrong, as in some essay tests where more than one answer is possible [Cronbach, 51]; [Keser, Ozdamli, Bicen, & Demirok, 10]; [Ozdamli, 09]. Split-half procedure involves scoring two halves of a test separately for each person and then calculating a correlation coefficient for the two sets of scores. The coefficient indicates the degree to which the two halves of the test provide the same results and hence describes the internal consistency of the test [Fraenkel, Wallen & Hyun, 06]. Selection of items in scale item-total correlation coefficient is .30 which criterions are based on the value.

The results of the analyses of questionnaire reveal that the items were appropriate parameters. Average items are between 2.94 and 4.20 standard deviations ranged from 1480 to 1230. It is seen that total materials of correlations are between .599 and .800. For the whole scale we use Cronbach alpha (α) .953 and half-split reliability of the scale is .900. "Attitudes towards tablet computer aided education" subscale Cronbach alpha (α) .921, .891 is half-split reliability. "The usability of the tablet computer aided education" for the sub-dimensions Cronbach's alpha is (α) .920, and for half-split reliability is .891. The assessment of internal reliability is important in scales. It indicates whether scales are measuring a single idea, and hence whether the items that makes up the forum are internally consistent [Sekaran, 03]. Thus, the internal consistency reliability of the measures used in this study can be considered as good. According to researchers [Hung, Chou, Chen, & Own, 10]; [Sekaran, 03], the closer the reliability coefficient is to 1.0, the better is the forum's reliability. According to [Fraenkel, Wallen, & Hyun, 06] reliable instrument is one that gives consistent results.

5 Discussion

With the introduction of mobile devices into our lives, differences were shown in many areas of our lives. Things that take our time, for example communication, banking, and shopping, etc. process have been simplified. These changes have impacted on the teaching-learning environment. Students exhibit a positive attitude towards technology has required changes in education. With FATIH project brought to agenda has mobilized researchers. With tablet-assisted education project brought to agenda, students and teachers attitudes towards these issues has revealed the necessity of the determination in exploratory study student's attitudes towards tablets supported education and tablets supported media aimed to determine the availability of a reliable and valid scale development. In order to determine the factor structure of the scale, exploratory and confirmatory factor analyses were collected in two sizes and scales of expression was observed. Then, the expressions of these factors under these two factors are examined and evaluated in terms of their characteristics has been named as "Attitudes towards tablet computer aided education" "The usability of the tablet computer aided education". Example for the first sample size expression is "The use of tablet computers in the course allows us to remember information better." While in the second dimension "I can study the subjects that I missed since courses are recorded in the video..."The results obtained in this study are high level of reliability

and validity of the scale has revealed that criteria. The scale in this study has sufficient merits to justify further research in the area.
Students' attitudes towards tablet supported education and training related to the suitability of tablet's was determined that the developed scale is reliable and valid. Like each study, this study has its limitations too. Limitation for this study is that it applies only to students. In future studies teachers and parent's size scales will be developed. Also in future studies by identifying educational needs, necessary training to the students will be planned and provided.

Acknowledgements

This project is funded by Center of Excellence, Near East University Scientific/Research Fund.

References

[Akinci, Kurtoğlu, & Seferoğlu, 12] Akinci A., Kurtoglu M., Seferoglu. S. S.: How Can FATIH Project Achieve Its Goals A Situation Analysis Study, 1–3, 2012.

[Akkoyunlu, 96] Akkoyunlu, B..: Bilgisayar Okur Yazarlıgı Yeterlikleri ile Mevcut Ders Programları'nın Kaynaştırılmasının Ögrenci Başarı ve Tutumlarına Etkisi, *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi,* 12, 127–134, 1996.

[Aksal, 11] Aksal, F. A.: Developing evaluative tool for online learning and teaching process. *Turkish Online Journal of Educational Technology*, *10*(3), 69–75, 2011.

[Bicen, & Arnavut, 15] Bicen, H., & Arnavut, A.: Determining the effects of technological tool use habits on social lives. *Computers in Human Behavior*, *48*, 457–462, 2015, http://doi.org/10.1016/j.chb.2015.02.012

[Bicen, Ozdamli, & Uzunboylu, 12] Bicen, H., Ozdamli, F., & Uzunboylu, H.: Online and blended learning approach on instructional multimedia development courses in teacher education. *Interactive Learning Environments*, June 2012, 1–20, 2012. http://doi.org/10.1080/10494820.2012.682586

[Bicen, & Uzunboylu, 13] Bicen, H., & Uzunboylu, H.: The Use of social networking sites in education: A case study of facebook. *Journal of Universal Computer Science*, *19*(5), 658–671, 2013. Retrieved from http://www.jucs.org/jucs_19_5/the_use_of_social/jucs_19_05_0658_0671_bicen.pdf

[Boukas, Kambourakis, & Gritzalis, 09] Boukas, L., Kambourakis, G., & Gritzalis, S.: Pandora: An SMS-oriented m-informational system for educational realms. *Journal of Network and Computer Applications*, *32*(3), 684–702, 2009. http://doi.org/10.1016/j.jnca.2008.07.002

[Büyüköztürk, 05] Büyüköztürk, Ş.: Anket Geliştirme. *Türk Eğitim Bilimleri Dergisi, 3(2),* 2005.

[Büyüköztürk, 04] Büyüköztürk, Ş.: Sosyal Bilimler için Veri Analizi El Kitabı İstatistik, Araştırma Deseni SPSS Uygulamaları ve Yorum. Retrieved May 17, 2015, from http://www.pegem.net/kitabevi/109-Sosyal-Bilimler-icin-Veri-Analizi-El-Kitabi-Istatistik-Arastirma-Deseni-SPSS-Uygulamalari-ve-Yorum-kitabi.aspx

[Cavus, 10] Cavus, N.: The evaluation of Learning Management Systems using an artificial intelligence fuzzy logic algorithm. *Advances in Engineering Software*, *41*(2), 248–254, 2010. http://doi.org/10.1016/j.advengsoft.2009.07.009

[Cronbach, 51] Cronbach, L. J.: Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334, 1951. http://doi.org/10.1007/BF02310555

[Çepni, & Akyıldız, 10] Çepni, S., Akyıldız, S.: Öğretim ilke ve yöntemleri. Nadir Kitap, 2010 Retrieved May 17, 2015, from http://www.nadirkitap.com/ogretim-ilke-ve-yontemleri-kitap4607582.html

[Çetinkaya, & Keser, 14] Çetinkaya, Levent, H. Keser.: Öğretmen ve Öğrencilerin Tablet Bilgisayar Kullanımında Yaşadıkları Sorunlar ve Çözüm Önerileri Problems Faced by Teachers and Students in Terms of Using Tablet PCs and Suggested Solutions Related to these Problems, January, 4, 13–34, 2014.

[Delen, & Bulut, 11] Delen, E., & Bulut, O.: The Relationship between Students' Exposure to Technology and Their Achievement in Science and Math. *Turkish Online Journal of Educational Technology - TOJET*, *10*(3), 311–317, 2011. Retrieved from http://eric.ed.gov/?id=EJ945004

[Fraenkel, Wallen, & Hyun, 06] Jack Fraenkel, Norman Wallen, H. H.: How to Design and Evaluate Research in Education, 2006. Retrieved May 17, 2015, from http://www.amazon.com/How-Design-Evaluate-Research-Education/dp/0078097851

[Gündüz, 12] Gündüz, H. B.: Digital divide in turkish primary schools: Sakarya sample. *Turkish Online Journal of Educational Technology*, *9*(1), 43–53, 2012.

[Gürbüztürk, & Şad, 12] Gürbüztürk, O., & Şad, S. N.: Turkish parental involvement scale: Validity and reliability studies. *Procedia - Social and Behavioral Sciences*, *2*, 487–491, 2010. http://doi.org/10.1016/j.sbspro.2010.03.049

[Güven, & Gökhan, 12] Güven, Gökhan, Y. S.: Bilgisayar Destekli Öğretimin 8 . Sınıf Fen ve Teknoloji Dersindeki Akademik Başarıya ve Öğrencilerin Derse Karşı Tutumlarına Etkisi, *9*(1), 2012.

[Güzel, 11] Güzel, H.: Factors Affecting the Computer Usage of Physics Teachers, April, 10*,* 122–132, 2011.

[Hung, Chou, Chen, & Own, 10] Hung, M.-L., Chou, C., Chen, C.-H., & Own, Z.-Y.: Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, 55(3), 1080–1090, 2010. http://doi.org/10.1016/j.compedu.2010.05.004

[Johnson, & McClure, 04] Johnson, B., & McClure, R.: Validity and Reliability of a Shortened, Revised Version of the Constructivist Learning Environment Survey (CLES). *Learning Environments Research*, 7(1), 65–80, 2004. http://doi.org/10.1023/B:LERI.0000022279.89075.9f

[Kapoun, Faculty, Šrámka, & Mariánské, 14] Kapoun, P., Faculty, P., Šrámka, F., & Mariánské, O.: MLearning - Efficient Support of Natural Science Education. *Global Journal of Information Technology, 04(2)*, 114–119, 2014.

[Kenar, 12] Kenar, İ.: Teknoloji ve Derslerde Teknoloji Kullanımına Yönelik Veli Tutum Ölçeği Geliştir ilmesi ve Tablet PC Uygulaması. *Eğitim Bilimleri Araştırmaları Dergisi, 2(2),* 123-139, 2012.

[Keser, 05] Keser, H., İnsan - Bilgisayar Etkileşimi ve Sağlığa Etkisi - Hafize Keser | 12,90TL - D&R : Kitap, 2005. Retrieved May 17, 2015, from http://www.dr.com.tr/kitap/%C4%B1nsan-bilgisayar-etkilesimi-ve-sagliga-etkisi/hafize-keser/egitim-basvuru/bilgisayar/urunno=0000000206750

[Keser, Ozdamli, Bicen, & Demirok, 10] Keser, H., Ozdamli, F., Bicen, H., & Demirok, M. S.: A Descriptive Study of High Students' Game-Playing Characteristics. *International Journal of Learning and Teaching*, *2*(2), 12–20, 2010.

[Keser, Uzunboylu, & Ozdamli, 11] Keser, H., Uzunboylu, H., Ozdamli, F.: The trends in technology supported collaborative learning studiesin 21st century, *3*(2), 103–119, 2011.

[Kline, 94] Kline, P.: Amazon.com: An Easy Guide to Factor Analysis, 1994. Retrieved May 17, 2015, from http://www.amazon.com/An-Easy-Guide-Factor-Analysis/dp/0415094909

[Kurt, Kuzu, Dursun, Güllüpınar, & Gültekin, 13] Kurt, A. A., Kuzu, A., Dursun, Ö. Ö., Güllüpınar, F., & Gültekin, M.: FATIH Projesinin pilot uygulama sürecinin değerlendirilmesi : Öğretmen görüşleri. *Journal of Instructional Technologies & Teacher Education*, *1*, 1–23, 2013.

[Markett, Sánchez, Weber & Tangney, 06] Markett, C., Sánchez, I. A., Weber, S., & Tangney, B.: Using short message service to encourage interactivity in the classroom. *Computers & Education*, *46*(3), 280–293, 2006. http://doi.org/10.1016/j.compedu.2005.11.014

[Motiwalla, 07] Motiwalla, L. F.: Mobile learning: A framework and evaluation. *Computers & Education*, *49*, 581–596, 2007. http://doi.org/10.1016/j.compedu.2005.10.011

[Namlu, & Odabaşı, 07] Namlu, A. G., & Odabasi, H. F.: Unethical computer using behavior scale: A study of reliability and validity on Turkish university students. *Computers & Education*, *48*(2), 205–215, 2007. http://doi.org/10.1016/j.compedu.2004.12.006

[Ozdamli, 09] Ozdamli, F.: A cultural adaptation study of multimedia course materials forum to Turkish, *World Journal on Educational Technology, 1(1)*, 30–45, 2009.

[Ozdamli, 13] Ozdamli, F.: Effectiveness of Cloud Systems and Social Networks in Improving Self-directed Learning Abilities and Developing Positive Seamless Learning Perceptions. *Journal of Universal Computer Science, 19(5), 602-618,* 2013.

[Ozdamli, & Uzunboylu, 14] Ozdamli, F., & Uzunboylu, H.: M-learning adequacy and perceptions of students and teachers in secondary schools. *British Journal of Educational Technology*, 2014. http://doi.org/10.1111/bjet.12136

[Rau, Gao, & Wu, 08] Rau, P.-L. P., Gao, Q., & Wu, L.-M.: Using mobile communication technology in high school education: Motivation, pressure, and learning performance. *Computers & Education*, *50*(1), 1–22, 2008. http://doi.org/10.1016/j.compedu.2006.03.008

[Sekaran, 03] Uma Sekaran, R. B.: Research Methods for Business: A Skill Building Approach, 5th Edition. Retrieved May 17, 2015, 2003. from http://eu.wiley.com/WileyCDA/WileyTitle/productCd-EUDTE00538.html

[Sharma, 96] Sharma, S.: Applied Multivariate Techniques, 1996. Retrieved May 17, 2015, from http://eu.wiley.com/WileyCDA/WileyTitle/productCd-0471310646.html

[Sharples, 00] Sharples, M.: The design of personal mobile technologies for lifelong learning. *Computers & Education*, *34*, 177–193, 2000. http://doi.org/10.1016/S0360-1315(99)00044-5

[Simsekli, 14] Simsekli, Y.: Science and technology teacher candidates' opinions about teaching of biology in high school, *Contemporary Educational Researches Journal 04(2)*, 42–47, 2014.

[Tsai, & Liu, 05] Tsai, C., & Liu, S.: Developing a Multi-dimensional Instrument for Assessing Students' Epistemological Views toward Science. *International Journal of Science Education*, *27*(13), 1621–1638, 2005. http://doi.org/10.1080/09500690500206432

[Tuan, Chang, Wang, & Treagust, 00] Tuan, H.-L., Chang, H.-P., Wang, K.-H., & Treagust, D. F.: The development of an instrument for assessing students' perceptions of teachers' knowledge. *International Journal of Science Education*, *22*(4), 385–398, 2000. http://doi.org/10.1080/095006900289804

[Uzunboylu, Bicen, & Cavus, 11] Uzunboylu, H., Bicen, H., & Cavus, N.: The efficient virtual learning environment: A case study of web 2.0 tools and Windows live spaces. *Computers & Education*, *56*(3), 720–726, 2011. http://doi.org/10.1016/j.compedu.2010.10.014

[Uzunboylu, & Ozdamli, 10] Uzunboylu, H., Ozdamli, F.: The Perceptions of University Students on Using E-Mail, Chat & Discussion Groups for Educational Purposes, *Cypriot Journal of Educational Sciences, 1(1),* 47–60, 2010.

[Uzunboylu, & Ozdamli, 11] Uzunboylu, H., & Ozdamli, F.: Teacher perception for m-learning: Scale development and teachers' perceptions. *Journal of Computer Assisted Learning*, *27*, 544–556, 2011. http://doi.org/10.1111/j.1365-2729.2011.00415.x

[Wurst, Smarkola, & Gaffney, 08] Wurst, C., Smarkola, C., & Gaffney, M. A.: Ubiquitous laptop usage in higher education: Effects on student achievement, student satisfaction, and constructivist measures in honors and traditional classrooms. *Computers & Education*, *51*(4), 1766–1783, 2008. http://doi.org/10.1016/j.compedu.2008.05.006

[Yavuz, & Caşkun, 08] Yavuz, S., & Coşkun, a. E.: Sinif öğretmenliği öğrencilerinin eğitimde teknoloji kullanimina ilişkin tutum ve düşünceleri. *Hacettepe Egitim Dergisi*, 276–286, 2008.