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Scale of teachers' beliefs on the effect of the use of mobile devices on students

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Abstract

The aim of this study was to develop a scale to determine beliefs of teachers about students' mobile device usage. Development process is composed of literature review, writing down the items, obtaining expert views, applying scale forms (N=130) and validity and reliability studies. As a result of factor analysis which is carried out within validity study of scale, it was determined that the scale is composed of 2 dimensions; academic development and social development. The scale which included 28 items in pilot application was reduced to 16 items as a result of analyses. Reliability coefficient of the whole scale is (∞) .91, reliability coefficient of academic development is .85, reliability coefficient of social development was calculated as .81.

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1. INTRODUCTION

As the mobile technologies become widespread, mobile devices which can execute many functions of the desktop computers have become indispensable for the new generation and students started to carry these technologies to the school environment. The usage of mobile devices eases the daily lives of the human life in many ways and makes them more effective in accessing information. Mobil device usage and human behaviors interact in the sense of social, emotional and personality characteristics (Butt, Phillips, 2008; Hong, Chiu, Huang, 2012; Turner, Love, Howel, 2008).

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Durin (2009) defines today's children as I-Children due to their interactive, independent and interpersonal characteristics. Moreover, he also stated that this new generation is easily adapted and manipulated to every kind of new technology and screen-based design. Children who we are educating today and will educate in the future are digital native and also their education needs, skills and interests differ compared to us. When the wider picture is considered, we confront a student community who are fully equipped in digital sense and whose education needs changed and transformed. Then what is the belief of teachers who fulfill education requirement of this community about the way students are influenced from mobile device usage? This question is the starting point of this study. Both observations and beliefs which include emotions and thoughts of teachers about this issue would give information about influence level of students. Moreover positive results of mobile learning which is supported by researches (Çavuş, Uzunboylu, 2009; Hwang, Wu, Ke, 2011; Marcos, Hilera, Barchino, Jiménez, Martínez, Gutiérrez, Gutiérrez, Otón, 2010; Sandberg, Maris, Geus, 2011) would give idea about students' integration to mobile devices and their including mobile devices into learning-teaching processes.

It is not difficult to think that a variable which influences us socially would also influence academic development and learning in education and teaching environments. In fact, in a study in which the effect of mobile computing devices in K-8 classes on motivation and learning of students was analyzed (Swan, Hooft, Kratcoski, 2005) teachers stated that in this way participation of students into learning activities have increased. According to the results of same study, students used these devices most commonly for note taking and journal writing. Apart from this, teachers draw attention to the fact that students who need special education benefit from mobile devices about writing skill. Therefore, it can be said that students who have different education requirements make use of mobile devices in various ways.

Therefore determining the usage purposes and levels of these devices by the students and examination of their effect to their academic and social features will be directive in regulation of student based and technology friendly learning environments. Determining the teacher opinions about the effect of mobile devices on educational and social features of students is important in terms of emphasizing the perceptions of teachers regarding the relation of technology and education. Teachers have the opportunity to closely monitor and evaluate the behaviors of students using the mobile devices in the education environment. The beliefs of teachers towards mobile devices in working environment, their thoughts regarding the result of mobile device usage of students, will be directive regarding usage of mobile devices with the aim of learning. Therefore it is important to present which way the mobile devices used by the students and the educational and social behavior changes they cause, are interpreted by the teachers. Consequently, the purpose of this study is to develop a scale to measure teachers beliefs regarding to usage of mobile devices of students.

2. METHOD

2.1. Participants

Study group of scale development process is composed of 132 teachers who work at different branches of government (2) and private elementary schools (3) in Istanbul in 2012-2013 academic year. 2 forms which were not answered appropriately were excluded as a result of study and the study was carried out with the answers of 130 (81 females, 49 males) teachers. Demographic information about study group was summarized in Table 1.

Table 1. Demographic information about study group

	Professional Experience					Total
	1-5 year	6-10 year	11-20 year	21-30 year	Over 31-40 year	

Woman	35	22	14	8	2	81
Man	16	12	15	9	1	49
Total	51	34	29	13	3	130

2.2. Scale Development Process

First of all a literature review was done in the process of scale development (Chen, Katz, 2009; Ching, Shuler, Lewis, Levine, 2009; Cheon, Lee, Croocs, Song, 2012; Druin, 2009; Hoadley, 2009; Sung, Mayer, 2012; Uzunboylu, Özdamli, 2011; Yang, 2012). In this review, basically possible effects of mobile devices in school environment and learning, their roles and effects in learning-teaching process, use of mobile device at schools were analyzed. Semi-structured interview was carried out with 2 teachers about use of mobile devices in school environment and their effects to students. In the interviews it was concluded that beliefs of teachers about mobile devices should be stated and scale composed of 28 items was formed accordingly. For the face validity and scope validity of scale, views of one education technologist and 2 experts from psychological counseling and guidance. According to these views, necessary regulations were made on items. The scale was applied on 132 teachers who serve at private and state elementary schools in different districts of Istanbul and data were analyzed with SPSS 16.0 statistics program.

Items of scale are in 5-grade likert type. Consensus about ideas of items were arranged in the levels of “Strongly Agree”, “Agree”, “Neutral”, “Disagree”, “Strongly Disagree”. These levels were scored as Strongly Agree=5, Agree=4, Neutral=3, Disagree=2, Strongly Disagree=1. Total score of scale was formed as the sum of answers over these scores. Greatness level of total score is interpreted as that teachers have positive belief about mobile device usage of students. Regarding the contrary, low scores can be interpreted as that the belief has negative trend. There are positive and negative items in the scale. During scoring of scale, items which include negative view was regarded as inverse items and coded inversely. For example answer of “Strongly Agree” given for a negative item is calculated as 1 point, “Strongly Disagree” answer is calculated as 5 points.

3. FINDINGS

3.1. Findings Concerning the Validity of the Scale

Exploratory factor analysis was carried out in order to determine structure validity on data obtained from 130 teachers. The method to be used varies according to the assumptions and aims of researcher in explanatory factor analysis. For this aim, Principal Components Analysis which helps to explain variables through “representation”, “summarization” and “addition” concept was used (Şencan, 2005).

Before analysis, Kaiser-Meyer-Olkin (KMO) coefficient and Barlett Test were used in order to determine whether data are suitable for factor analysis or not. KMO being higher than .60 means that data are suitable for factor analysis (Büyüköztürk, 2005). In this study KMO was found to be .85. This result shows that data are quite suitable for factor analysis.

Table 2. Results of KMO and Bartlett Tests

Kaiser-Meyer-Olkin Sampling Adequacy Measure		0,85
Bartlett's Test Results		
X^2		1711,953
Degree of Freedom		378
p		0,00

For the factor analysis of scale within the scope of construct validity, explanatory factor analysis was done by using Varimaks rotation and Principal Components Analysis. As a result of factor analysis, it was found that 16 items of scale have two sub-dimensions whose eigenvalue is bigger than 0,30. Eigenvalue graphics of the scale supports this finding. Total variance explained for the scale by these factors is 36,948%. This situation shows that the scale is composed of items which generally measure similar characteristics..

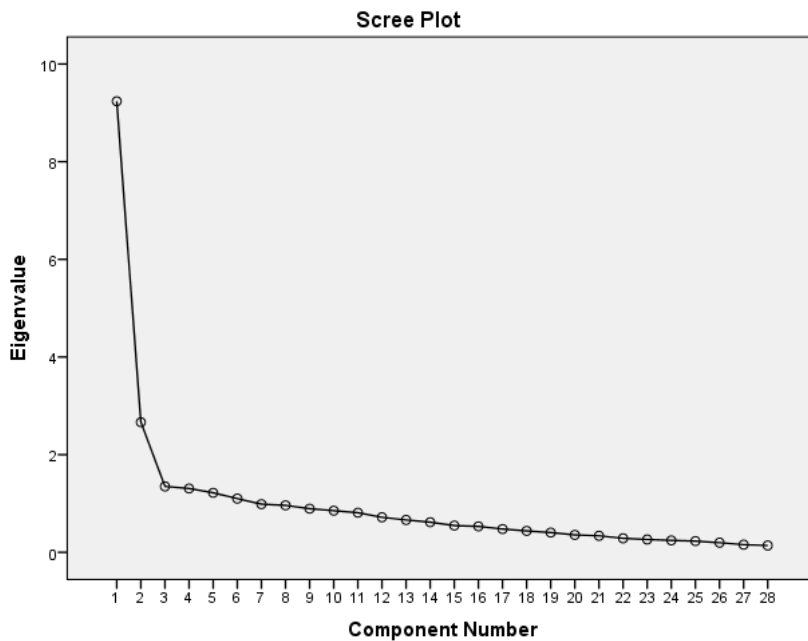


Figure 1. Eigenvalues Graphic

In Figure 5, it is seen that there is a sudden decrease after the first factor. This situation shows that scale may have a general factor. Following the other factor coming next, eigenvalue of factors included within graphic have similar values. Therefore these dimensions which are not explained theoretically were disregarded. While the items to be included within scale, items which have .40 and above factor load.

As a result of factor analysis, it is understood that items are grouped under two sub-dimensions which qualify beliefs of teachers about the effect of mobile devices on development of students. The first factor explains “academic development” (11 items) dimension, the second factor explains “social development” (5 items) dimension. As it is seen in Table 3, factor load of 18 items in the scale is higher than .40. Factor load of academic development dimension of scale varies between .75 and .40. Only factor load of 28th item of the scale concerning critical thinking was calculated as .045 however in spite of this it was not excluded from the scale as a result of common view of researchers. In the literature there also views that thinking skills and critical thinking can be supported with mobile learning (Çavuş, Uzunboyulu, 2009; Naismith, 2004). Moreover it was thought that it would be beneficial to learn beliefs of teachers today where the education of thinking skills has gained importance. Considering in this sense, it was concluded that the item about critical thinking skill is an important item and should be included in the scale. Explained variance of this dimension of scale is 19,665%. Factor load of social development dimension of scale varies between .73 and .41. Explained variance of this dimension is 17,283%.

Table 3. Results of the Factor Analysis of the Scale

Item No	İtem	Factor loadings after rotation	
		F 1	F 2
25	Frequency of using mobile device is the reason for inability of students in answering open-ended questions.	,75	
18	I observe that students who have the habit of using mobile devices at an earlier age compared to their peers are more impatient.	,70	
26	Mobile device usage creates motivation problems for learning among students.	,65	
13	Mobile device usage prevents self-confidence development.	,60	
17	I think that students who frequently use mobile device suffer from depression much more compared to those who do not use frequently.	,58	
20	Intensive use of mobile devices would result in memory problems among students.	,57	
19	Mobile devices influence studying habits of students negatively.	,54	
15	Mobile devices cause sleeping disorder among students.	,50	
14	I think intensive mobile device usage would cause attention deficit among students.	,49	
27	Mobile device usage decreased academic achievement of students.	,45	
28	Mobil device usage improves critical thinking skills of students.	,045	
6	I think mobile devices isolate students.		,73
10	I think mobile devices cause problems in communication of children with their families.		,69
1	I think mobile devices (i-pad, smartphone etc.) prevent socialization of students.		,64
12	Students have to use mobile devices in order to be “socially accepted”.		,56
16	Contrary to common belief, social media contributes to socialization of children.		,41
Eigenvalue		9,24	2,68
Variaton (%)		19,665	17,283

*p< .05

3.2. Findings of Reliability of the Scale

Cronbach alpha (α) internal consistency level was calculated in order to determine reliability of the scale. Reliability (α) was found to be .89 for the first form of scale which is composed of 28 items. Cronbach alpha internal consistency level (α) was found to be .91 for the final form of scale which is composed of 16 items. Internal consistency coefficient of academic development sub-dimension is .855, internal consistency coefficient of social development sub-dimension is .815. This result shows that the final scale has high reliability.

Another study which was carried out about reliability of scale is calculation of correlation coefficient between item score and scale score. At the end of this study, it was determined how each item effects scale reliability and items whose item-total correlation is below $r=.30$ were excluded from the scale. As it is seen in Table 4, correlation between scale items and total scale varies between .74 and .41. However, 28th item whose Item-Scale correlation is below .30 was excluded from the scale due to reasons mentioned within the scope of construct validity study.

Table 4. Teachers beliefs scale item total Correlations

Item No	Item-Scale r	Item No	Item-Scale r
25	,41	6	,69
18	,64	10	,74
26	,67	1	,61
13	,56	12	,59
17	,51	16	,47
20	,70		
19	,69		
15	,53		
14	,63		
27	,54		
28	,23		

* $p < .05$

In this study, minimum score to be obtained from general average of scale is (16x1) 16 and maximum score is (16x5) 80.

Table 5. Descriptive statistics of scale total

	N	Min.	Max.	\bar{X}	Ss
Total Scale	130	16	80	36,43	10,37
Factor 1: Academic development	130	11	55	25,35	7,21
Factor 2: Social development	130	5	25	11,07	3,98

When the scores obtained from the scale of teachers' beliefs is analysed, it was seen that the lowest score was (16) and the highest score was (80) and the average of scale is ($\bar{X}=36,43$). Although it is not the direct subject of scale development issue, when descriptive statistics obtained from scale was analysed, it was observed according to the average score of teachers ($\bar{X}=36,43$) that they believe mobile device usage of students have negative effect on their academic and social development. When the averages are analysed according to sub-dimensions of scale it is observed that teachers believe mobile device use have negative effect on students for both dimensions (academic development ($\bar{X}=25,35$), social development ($\bar{X}=11,07$)).

4. CONCLUSION

In this study, a scale was developed a scale to determine teachers' beliefs about mobile device usage of students. There are 16 items in the scale which was developed in 5-graded Likert type. Exploratory factor analysis was carried out within the scope of validity study of scale. There are 2 sub-dimensions of scale as a result of factor analysis. These are academic development and social development. Items whose factor load is below .40 were excluded from the scale and the scale which was composed of 28 items in the beginning was completed with 16 items finally. In the studies of factor analysis, conditions of items' factor load are above .30 and explained total variance being 40% at least is regarded sufficient in the sense of social sciences (Klein, 1994). It can be said that this scale is a valid and reliable instrument in measuring beliefs of teachers about students' mobile device usage.

Presenting thoughts and beliefs of teachers about the effect of mobile devices on students would shed light upon necessary regulations concerning education. Therefore results to be obtained from mentioned scale would contribute to determination of observed effects of mobile devices on students. Moreover, it would also contribute to teachers' arranging mobile activities which would enrich learning-teaching process. In fact; Liu, Wang, Liang, Chan, Ko, Yang (2003), stated that mobile learning devices can solve the dilemma in traditional and computer classrooms and allow students to participate in both physical and virtual learning activities. In fact, using skills, attitude and belief levels of teachers about mobile technologies should be determined in order to arrange mentioned activities in a way that would increase quality of education and it must be supported with necessary in-service education studies.

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