Teacher candidates' use of instructional technology And Material Development Self Efficacy Processing Scale: A Study Of Developing Scale

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Abstract

The purpose of this study is to develop a scale for processing teacher candidates' use of instructional technology and material development self efficacy . A draft of the scale which contained 52 items; was composed based on researcher's field scanning and both the opinions of experts and students. A draft of the scale was applied to 499 students who are taking instructional technology and material development lesson and attending to different departments at University of Ahi Evran in 2014-2015 academic year. At the end of the Factor Analysis, a scale was obtained totally 34 items with 5 factors. The structure which was obtained at the end of the Explanatory Factor Analysis was tested whether it was verified by construct validity or not. Regarding Self Suffiency processing scale, five factor solution model's goodness of fit test shows that the model (the hypothesis model) corresponds to the observed data. The scale's KMO (Kaiser – Meyer - Olkin) value was .944, the Bartlett test value was .00 and Cronbach- Alpha Internal Consistency was .95.

Keywords: Teacher candidates, instructional technologies, self-efficacy, scale.

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1. Introduction

It is inevitable that the developments occurring in technology affect the learning-teaching processes as well as every field of the individual life. In accordance with this process, the educational institutions are required to train individuals who have the skill of using instructional technologies, can reach the information, can use the information effectually (Seferoglu, 2009). The instructional technologies must be used efficiently for making a significant contribution to teaching-learning technologies (Sadi et al., 2008). The efficient usage of the instructional technologies provide the students to comment and comprehend the cases by arousing their attention related with the course (Akpınar, Aktamıs & Ergin, 2005) and make contribution to their cognitive, affective and psychomotor developments (Sert, Kurtoglu, Akıncı & Seferoglu, 2012).

An important part of the researches related with the instructional technologies, concentrates of the effectiveness of the education (Dunmire, 2010). The teacher candidates are expected to determine their perceptions in integrating the technology into the education programs (Usta & Korkmaz, 2010) and to have material development competence by using the instructional technologies (Gunduz & Odabası, 2004). However, it is thought that many teacher candidates do not have material development skill and are not willing to use materials in their courses (Alım, 2015). In case the teaching materials are not efficiently used, the actualization of the success in desired level, is not possible (Sahin, 2015). It is attractive for the teacher candidates to develop teaching materials which the teachers and their students shall be motivated and enjoy in accordance with the current opportunities and to use them within class (Demirel, 2007) and self-efficacy perception shall be an important factor in achieving the goal while developing material (Demirel, 2012).

The self-efficacy is a basic concept of Bandura's Social Learning Theory. The self-efficacy determines the duration of the changed attitudes of the persons. (Bandura, 1978). The self-efficacy is the belief of one individual for having the skill of fulfilling a task (Gist, 1987). Together with the increase in the importance of using the instructional technologies in present day, the self-efficacy of the teacher candidates who shall use the instructional technologies and form the learning materials which are appropriate to this conditions, becomes more important (Aslan-Efe, 2013).

The awareness of the teacher candidates must be raised in using the current instructional technologies in education environments and in gaining material development skills. A more attractive education shall be actualized in accordance with the field information of the teacher candidates and the teacher candidates are expected to develop materials which shall provide a more eager learning. This study has been made for developing a scale related with the determination of self-efficacy of the teacher candidates in developing material and using the instructional technologies.

2. Methodology

2.1. Research Group

The participants of the research consists of total 499 teacher candidates who study in different departments of University of Ahi Evran Faculty of Education in 2014-2015 spring semester and take the course of Instructional Technologies and Material Development. 32.3% of the students in research group are male students and 67.7% are the female students.

2.2. Measuring Instrument

In the stage of developing the scale, an item pool consisting of 72 articles, is created by making a literature review (Cetin, Bagceci, Kinay & Simsek 2013; Fleming & Levie, 1978; Romiszowski, 2013; Varank & Ergun, 2009;; Yalın, 2014). Then thinking out loud method is applied to 4 students who are randomly selected from the senior classes. The students are requested to read the items one by one

and to comment on the each item as aloud. Then a regulation is made on the items for providing the understandability of the items related with the subject. Thinking out loud is having the teacher express the thoughts of those who think out loud for determining the reading approaches and the strategies of the readers (Davey, 1983). Besides the number of the items has been decreased to 53 by making the transaction of regulation and by being examined by 2 language experts, 4 pedagogues, 4 field experts who have completed their doctorates for providing the validity of scope and face. The items in scale have been formed in five point Likert scale and the items are classified in the form of, "1-Strongly disagree ", "2-Disagree ", "3-Indecisive", "4-Agree", "5-Strongly agree ".

2.3. Analysis of the data

The developed outline scale has been applied to the students in research group by the researches and the validation and reliability analyses of the obtained data have been made. For showing the conformity of the data to the factor analysis and the sufficiency of the sample number, Barlett test of Sphericity and Kaiser-Meyer-Olkin (KMO) test has been applied. Exploratory factor analysis (AFA) has been made for examining the construct validity of the scale. The factor analysis is a method which gathers the alike items and explains in a common factor (Buyukozturk, 2007). For determining the reliability, Sub-Top Group averages and item-total point correlations have been calculated. SPSS 20.0 packaged software has been used in whole analyses.

3. Findings and comments

3.1. Findings related with the validation of the scale

For examining the construct validity of the scale, exploratory factor analysis has been tried to be made in the outline form. The conformity of exploratory factor analysis of the data before the factor analysis has been determined by Barlett test of Sphericity and Kaiser-Meyer-Olkin (KMO). KMO value of 0.60 and over and the significance of chi square which is prepared with Barlett test of Sphericity, shows the conformity of data matrix (Hayduk, 1996; Buyukozturk, 2007). For examining the conformity of the data to exploratory factor analysis, KMO and Barlett test of Sphericity has been implemented.

Table 1. Results of Kaiser Meyer Olkin and Barlett Test of Sphericity

Kaiser Mayer Olkin (KMO)	Barlett's Test of Sphericity	Sd	P
.944	11096.309	561	.000

As seen in Table 1, the significance of the result of KMO value .944, Barlett test of Sphrecitiy (p<0.001) shows that the data is appropriate for making factor analysis. For usage of instructional technologies and material development self-efficacy scales, Exploratory Factor Analysis and Varimax upright conversion technique has been used in factor analysis transactions. The items which their factor loads are 0.45 or over, give better results. The items which their load values between the factors are smaller than 0.10, are kept beyond the analysis (Buyukozturk, 2007). The items which are under 0.45 and are accepted as cyclical (7, 8, 9, 10, 11, 23, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43 and 47) are removed from the scale and the factor analysis has been repeated for the rest 34 items in this study. The items which their load values between two factors are lower than 0.10 and the items with difference are cyclical (Yavuz, 2005). The factor analysis results of the usage of instructional technologies and material development self-efficacy scale, are shown in table 2.

Table 2. Factor analysis results of self-efficacy in using instructional technologies and developing material

Item No	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1			.712		
2			.731		
3			.770		
4			.782		
5			.752		
6			.710		
7					.787
8					.829
9					.866
10					.775
11					.742
12				.600	
13				.761	
14				.760	
15				.727	
16				.747	
17				.593	
18		.522			
19		.681			
20		.694			
21		.645			
22		.700			
23		.645			
24		.633			
25		.497			
26	.452				
27	.634				
28	.588				
29	.633				
30	.734				
31	.674				
32	.700				
33	.668				
34	.599				

As seen in Table 2, 34 items which are obtained in the scale, gather under 5 (five) factor. It is seen that the factor loads of the 34 items which are left as the result of the analysis, change between 0,452 and 0,866. The factors which are obtained in the scale, are designated according to the content of the items. The first factor is "Preparation of material by using authoring software", second factor is "Determining the educational situations related with the acquisition of a course", third factor is "Comprehending the technology size", fourth factor is "Comprehending the instructional material size ", fifth factor is "Comprehending the system and system approach size".

3.2. Findings related with the reliability of the scale

The reliability is the stability of the results which are obtained from the measurements in a measurement transaction (Carmines & Zeller, 1987). Cronbach Alpha (α) internal consistency reliability coefficient which is used in calculation of the reliability of the scale, has been found as 0.95 in this study. In determination of item distinctiveness power of the items in scale, t value and item total correlation values between the top group and sub-group item average points of each article, are calculated. The high and positive value of the item-total test correlation expresses that the reliability (internal consistency) of the measuring instrument is high (Bozdogan & Ozturk, 2008).

Table 3. Item Total Correlation Results and t-test for item averages of the group with lower 27% and upper 27% of the scale

Item No		N	X	Sd	Df	t	Item Total Correlation	P
1	Top Group	135	1,13476	,11193	190,084	12,110	,690	0,000
	Sub Group	135	1,57635					
2	Top Group	135	,95157	,10342	192,164	11,173	,688	0,000
	Sub Group	135	1,35955					
3	Top Group	135	1,12548	,10167	206,723	13,041	,714	0,000
	Sub Group	135	1,52637					
4	Top Group	135	1,08804	,09811	202,371	13,062	,691	0,000
	Sub Group	135	1,47493					
5	Top Group	135	1,02658	,09924	209,426	12,316	,651	0,000
	Sub Group	135	1,41786					
6	Top Group	135	1,13228	,10191	184,850	13,084	,668	0,000
	Sub Group	135	1,53438					
7	Top Group	135	1,13976	,10201	232,437	13,144	,531	0,000
	Sub Group	135	1,54172					
8	Top Group	135	1,19792	,10259	244,955	13,646	,537	0,000
	Sub Group	135	1,60208					
9	Top Group	135	1,13468	,10463	250,741	12,814	,523	0,000
	Sub Group	135	1,54680					
10	Top Group	135	1,19721	,11051	258,777	12,803	,557	0,000
	Sub Group	135	1,63242					
11	Top Group	135	1,11641	,10262	253,425	12,848	,520	0,000
	Sub Group	135	1,52062					
12	Top Group	135	1,09012	,09709	215,576	13,199	,635	0,000
	Sub Group	135	1,47285					
13	Top Group	135	1,17203	,09310	208,769	14,561	,673	0,000
	Sub Group	135	1,53909					
14	Top Group	135	1,11719	,10212	206,115	12,912	,669	0,000
	Sub Group	135	1,51984					

15	Top Group	135	1,05255	,09734	209,050	12,784	,690	0,000
	Sub Group	135	1,43634					
16	Top Group	135	1,09405	,09508	209,575	13,478	,675	0,000
	Sub Group	135	1,46891					
17	Top Group	135	,96062	,09889	213,379	11,685	,644	0,000
	Sub Group	135	1,35049					
18	Top Group	135	,98659	,09325	218,753	12,551	,659	0,000
	Sub Group	135	1,35415					
19	Top Group	135	,96955	,09813	216,792	11,851	,642	0,000
	Sub Group	135	1,35638					
20	Top Group	135	1,02384	,09317	232,291	12,959	,680	0,000
	Sub Group	135	1,39098					
21	Top Group	135	1,06201	,09255	210,398	13,447	,733	0,000
	Sub Group	135	1,42688					
22	Top Group	135	1,02937	,09412	230,293	12,907	,673	0,000
	Sub Group	135	1,40026					
23	Top Group	135	1,04486	,09757	244,544	12,679	,624	0,000
	Sub Group	135	1,42922					
24	Top Group	135	,98633	,09715	223,984	12,123	,624	0,000
	Sub Group	135	1,36923					
25	Top Group	135	1,09911	,10006	223,573	12,955	,680	0,000
	Sub Group	135	1,49348					
26	Top Group	135	1,10651	,09626	204,724	13,467	,657	0,000
	Sub Group	135	1,48608					
27	Top Group	135	1,13132	,09870	204,338	13,434	,631	0,000
	Sub Group	135	1,52053					
28	Top Group	135	,97919	,09324	214,860	12,473	,629	0,000
	Sub Group	135	1,34674					
29	Top Group	135	1,13157	,10235	210,232	13,027	,633	0,000
	Sub Group	135	1,53509					
30	Top Group	135	1,03387	,10685	220,307	11,647	,603	0,000
	Sub Group	135	1,45502					
31	Top Group	135	,97160	,10087	224,884	11,603	,573	0,000
	Sub Group	135	1,36914					
32	Top Group	135	1,19417	,10061	193,131	13,842	,651	0,000
	Sub Group	135	1,59102					
33	Top Group	135	1,07385	,10157	211,956	12,543	,573	0,000
	Sub Group	135	1,47430					
34	Top Group	135	,91687	,10598	188,201	10,624	,566	0,000
	Sub Group	135	1,33498					

Significant values for n=499 $n_1 = n_2 = 135$, p<.01

As seen in Table 3, the value of item-total correlation of the items in scale changes between 0,520-0,714 and t values are significant. It may be said that the item distinctiveness power of the items in scale is acceptable level.

4. Conclusion

A scale has been developed for determining the usage of instructional technologies and material development self-efficacy of the teacher candidates. Analyses were made on the data which is

obtained as the result of the pre-implementation made on the teacher candidates. For determining the construct validity of the scale, the exploratory factor analysis was made. The items which are under 0.45 and are accepted as cyclical are removed from the scale. When the results of the factor analysis were examined, it is observed that 34 items have gathered under five factors. Cronbach Alpha internal consistency coefficient of the scale has been found as (α) .950. Cronbach Alpha internal consistency coefficient of the factors forming the scale is found respectively as follows; for the first factor α=.876; for the second factor α=.895; for the third factor α=.920; for the fourth factor α=.895 and for the fifth factor α=.897.

As the result of the validation and reliability analyses, "Instructional Technologies Usage and Material Development Self-Efficacy Determination Scale " has been developed. It may be said that the scale is a valid and reliable scale which may be used in scientific studies in accordance with the obtained findings.

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