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A study on developing "Microteaching scale" for student teachers

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Abstract

Microteaching is a technique which is used to train student teachers in a minimized and restricted or artificial teaching environment. The main purpose of this study is to develop a reliable and valid instrument which measures the effect of microteaching technique in student teachers' knowledge base development from their perspectives. The scale was conducted on 170 student teachers and for the factor analysis an SPSS package program was applied. The total variance was determined as % 57.3. As a result of the validity and reliability studies a sample pool, containing 45 items, a 33-item, 4-factor and 5-point likert type of microteaching scale (KMO= .936; Barlett= 3604.251 and α=.88) was developed. The results show that the scale is a valid and reliable instrument for determining the role of microteaching technique of the student teachers' knowledge base development from their own perspectives.

Keywords: Microteaching, teacher education, science education

1. Introduction

Teaching method courses have recently gained increased importance in current teacher education programs in Turkey. Particularly, Special Teaching Methods-II course is one such course where student teachers are offered the principle of life-long learning, through learning by doing. The course provides student teachers planning and implementation opportunities in artificial class environments for subjects to be chosen from Science & Technology Programs for 4-8th grades (Yakar, Taşkın-Can, & Uçak, 2010). In teacher training, microteaching is especially important in the application of theory to practice (Kuran, 2009). Microteaching method was first implemented at Stanford University, USA, by Dwight Allen and colleagues as part of an experimental program aimed to raise the quality of teacher training programs. It was one of the innovations created in the 1960's and 1970's by American educators who were encouraged to propose and implement a variety of innovations. Its theoretical structure was formulated and evaluated at a later stage. This method is also used in teacher training institutions as well as in public and private organizations for in-service training (Güney & Ersoy, 2010). Microteaching is a method that aims to teach pre-defined critical teacher behavior of student teachers (Görgen, 2003). Definitions of microteaching ensure that the method provides teaching experience in a safe and controlled environment (Kazu, 1966).

It is important for science student teachers to observe which teaching methodology to choose for each topic. The implementation of microteaching provides opportunities for class discussions by reviewing the student teacher's behavior. It helps to identify the source of the errors and provides for solutions (Erökten & Durkan, 2009). In other

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words, microteaching enables student teachers to perceive teachers' behaviors extensively and observe each other's performance through analyzing and reflecting on the experiences. Therefore, microteaching enables student teachers to be aware of their own shortcomings in the Subject Matter Knowledge and enables them to develop their Pedagogical Content Knowledge. Microteaching also allows the acceptance of the role of technology in education. For student teachers to reach the expected level of competency in their professional lives, it is imperative that they accept the role of technology and attain skills in using them. This is because when student teachers take up duty, they shall provide for a technological environment for the student groups (Erdemir, Bakırcı & Eyduran, 2009). Through microteaching, it is possible to create awareness about the role of technology in teaching. While student teachers need more time and effort to implement microteaching methodology, the stage fright some student teachers are facing while being video-recorded may result in the student teachers' inability to display their true capacity (Çakır, 2000). The main purpose of this research is to develop a reliable and valid instrument which measures the effect of microteaching technique in student teachers' knowledge base development from their perspectives.

2. Methodology

This research is a scale development study. This research has been carried out in the academic term of 2009 - 2010 at the School of Education, and Department of Science Education of the Ahi Evran University. The developed scale has been conducted on 170 primary science student teachers who enrolled Special Teaching Methods-II course which took place in the curriculum of 7th semi-semester of primary science teacher education program.

2.1. Developing the Scale

Microteaching scale has been developed in five stages; determination of the scale items, taking the expert opinion, pilot study, reliability and validity stages. Consultation of two science education experts for determining the content and construct validity of the scale. Following the implementation of some changes suggested by the experts, the next stage was to check its reliability. Five-point Likert-type scale (5, strongly agree; 4, agree; 3, undecided; 2, disagree; 1, strongly disagree) was applied to 170 student teachers. To determine whether or not to perform factor analysis, the KMO (Kaiser-Meyer- Olkin) Value and Bartlett's Test of Sphericity were calculated. The KMO and Bartlett measurement results are presented in Table 1.

Table 1: Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity results

Kaiser-Meyer-Olkin Value		.936
Bartlett's Test Value	**Barlett**	3604.251*
	SD	169
	p	.000

* p<,01

KMO Value being over 0.50 (KMO=0,936, p<0.01) indicates that factor analysis sampling was appropriate. Bartlett's Test of Sphericity result is significant as (3604.251) p<,01 in that it shows that the measuring tool can be differentiated into factor structures.

2.2. Reliability Analysis of the Scale

Using item-total correlation in Microteaching scale analysis, the reliability of test items, and t-test for the reliability of the meaningfulness of the median of top 27 % and bottom 27 % groups, as well as the reliability of Cronbach alpha were ascertained. Results are shown in Table 2. According to Büyüköztürk (2009) while item-total point correlation explains the relationship between points received on test items and the total points of the test, the fact that the correlation between item –total is positive and high, shows that there is sampling of similar behavior of items and that the test has high internal consistency. Item-total score correlations in the scale were found to alter between .31 and .72 and the t-values were observed to be generally significant (p<.01). Items 5, 7, 13, 18, 22, 24, 30,

35 and 43 were not significant. Items 11 and 39 with low correlation were dropped from the scale. Consequently, 12 items with high reliability, applied to measure the same behavior were removed from the scale. The Alpha coefficient of the scale was calculated as .88. The results of the analysis of the item-total correlations are shown in Table 2.

Table 2: Item-Total Correlation

Item	Item-total correlation	t (Bottom%27-top%27)[b]	alpha coefficient
1	.55	5.34*	.876
2	.59	6.44*	.874
3	.19	3.04*	.881
4	.44	4.50*	.876
5	.04	.51	.885
6	.45	4.72*	.876
7	-.24	1.93	.886
8	.55	6.76*	.875
9	.48	7.05*	.875
10	.68	9.13*	.873
11	-.32	3.97*	.888
12	.63	6.74*	.87
13	-.08	.0	.88
14	.58	7.14*	.88
15	.60	6.95*	.87
16	.48	4.58*	.88
17	.57	6.42*	.88
18	-.06	.27	.89
19	.59	4.93*	.87
20	.55	7.14*	.87
21	.63	6.19*	.87
22	.04	.08	.88
23	.72	8.10*	.87
24	-.10	.69	.88
25	.25	2.70*	.88
26	.62	6.66*	.87
27	.66	8.13*	.87
28	.69	8.28*	.87
29	.67	8.15*	.87
30	-.22	2.15	.89
31	.53	5.62*	.88
32	.71	7.98*	.87
33	.65	7.14*	.87
34	.52	5.08*	.88
35	.01	0.62	.88
36	.59	6.22*	.87

37	.72	7.74*	.87
38	.65	7.08*	.87
39	-.45	4.3*	.89
40	.52	7.44*	.88
41	.49	5.28*	.88
42	.69	7.02*	.87
43	.12	.39	.88
44	.64	6.74*	.87
45	.50	5.76*	.88
$a_{n=}$ 170, $b_{n1} = b_{n2} = 85$, alpha= .88, *p < .01			

Analysis of converted basic item components is presented in Table 3.

Table 3: Factor Analysis (analysis of converted basic components)

Item	Factor Common Variance	Factor-1 Load Value	Analysis of converted basic components			
			Factor-1	Factor-2	Factor-3	Factor-4
12	.625	.735	**.517**			
14	.696	.660	**.782**			
15	.630	.675	**.669**			
16	.656	.645	**.707**			
17	.665	.681	**.712**			
23	.668	.801	**.560**			
25	.269	.396	**.451**			
28	.686	.802	**.517**			
40	.435	.595	**.542**			
44	.585	.696	**.567**			
3	.311	.145		**.439**		
20	.560	.623		**.543**		
29	.599	.719		**.602**		
31	.363	.559		**.482**		
33	.682	.725		**.601**		
36	.536	.650		**.578**		
37	.757	.784		**.632**		
38	.675	.708		**.683**		
42	.710	.728		**.705**		
1	.598	.636			**.547**	
4	.508	.558			**.623**	
6	.561	.555			**.702**	
10	.617	.746			**.540**	
21	.515	.711			**.437**	
26	.661	.730			**.668**	

27	.584	.743	**.511**	
32	.734	.806	**.511**	
34	.453	.585	**.511**	
2	.563	.651		**.605**
8	.557	.629		**.527**
9	.666	.531		**.774**
41	.483	.499		**.642**
45	.405	.550		**.503**
Explained Variance Total 57.3 %		Factor-1: 15.9 %	Factor-2: 15.0 %	Factor-3: 14.4 % Factor-4: 12.0 %

Through factor analysis, an attempt was made to bring together variables that measure the same structure with a small number of factors (Büyüköztürk, 2009). Furthermore, those item loads larger than 0.40 were chosen and included in the scale. Item 19 was excluded from the scale because it was not a disassociated item and the remaining 33 items were loaded on the 4 factors labeled Pedagogical Content Knowledge (PCK), Experience, Performance and Professional Awareness. These are:

- Factor-1: The effect of Microteaching on PCK (12, 14, 15, 16, 17, 23, 25, 28, 40, 44)
- Factor-2: Effect on Experience (3, 20, 29, 31, 33, 36, 37, 38, 42)
- Factor-3: Effect on Performance (1, 4, 6, 10, 21, 26, 27, 32,34)
- Factor-4: Effect on professional awareness (2, 8, 9, 41, 45)

The total variance was determined as % 57.3. According to Scherer (1988, in Tavşancıl & Keser, 2001) variance ratios between 40% and 60% are considered satisfactory. The variance of factors 1, 2, 3, and 4 were found to be 15.9 %, 15 %, 14.4 % and 12 % respectively.

Table 4: Reliability Analysis of Factors

Factor	Cronbach Alpha	N (number of items)
Factor 1	.91	10
Factor 2	.86	9
Factor 3	.89	9
Factor 4	.77	5

As a result of analysis of factors 1, 2, 3, and 4, Cronbach Alpha internal consistency coefficient has been determined as; 0.91 for Factor 1, 0.86 for Factor 2, 0.89 for Factor 3, and 0.77 for Factor 4.

3. Conclusion

As a result of the validity and reliability studies of the pool of samples containing 45 items, a 33-item, 4-factor and 5-point likert type of microteaching scale (KMO= .936; Barlett= 3604.251 and α=.88) was developed. These results show that the scale is a valid and reliable instrument for determining the role of microteaching technique of the student teachers' knowledge base development from their own perspectives.

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MICROTEACHING SCALE

Factor 1:The impact of microteaching on Pedagogical Content Knowledge (α= ,91)
Microteaching gave me the opportunity to use what I have learned
I got professional experience
Feedback from peers was constructive
Microteaching helped me see my mistakes
Microteaching supports the principle of learning by doing
I got experience prior to teaching in a real environment
Comments and criticisms allowed for exchange of ideas on different topics
Microteaching helped me gain experience on managing a class
Comments made by the class teacher were constructive
I had the opportunity to comment on my own performance.

Factor 2: The impact on experience ***(α= ,86)***
The duration was not long enough
Microteaching contributed to my personal growth
Microteaching taught me the skill of constructive criticism
Thanks to microteaching, I can now detect mistakes made in any science class
It helped me become open to criticism
Thanks to microteaching, I came to like teaching more
It helped me develop my teaching skills
It helped me improve my public speaking skills
It gave me the opportunity to overcome my nervousness

Factor 3: Effect on performance ***(α= ,89)***
It was a useful experience for me
I had the opportunity to observe my own performance
Microteaching allowed me to see my mistakes and shortcomings
It helped me prepare for my teaching career
It helped me develop my teaching skills
Microteaching taught me prepare better lesson plans
I became more aware of the attributes teachers need to have
I had the opportunity to better see the difference between theory and practice
Microteaching should be implemented in all teacher training institutions on all students teachers

Factor 4: Impact on professional awareness ***(α= ,77)***
Thanks to microteaching, I am now more self-confident
I am informed about how to handle a subject
Microteaching helped me learn more in my field of teaching
I became aware of my shortcomings in my field of teaching
It helped me prepare for a real classroom environment

Reliability values of Microteaching Scale: KMO: .936; Barlett: 3604.251; Cronbach Alpha: .88