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## Prospective teachers' evaluations in terms of using reflective thinking skills to solve problems

Murat Tuncer<sup>a\*</sup>, Ender Ozeren<sup>b</sup>

<sup>a</sup>Firat University, Faculty of Education, Elazig 23119, TURKEY

<sup>b</sup>Dicle University, Diyarbakir TURKEY

### Abstract

The general aim of this research is to evaluate prospective teachers in terms of their use of reflective thinking skills to solve problems. With this aim, the views' of prospective teachers on problem solving and reflective thinking skills has been researched to determine whether there is a significant difference with respect to their gender, departments and classes. As a means of data collection, The Scale of Reflective Thinking Skills to Solve Problems, which was developed by Kızılkaya and Aşkar (2009), has been used. The study population is prospective teachers who attend the Education Faculty of Firat University. Looking at the opinions of prospective teachers in the different factors of the scale; in the question dimension, in the evaluation dimension, in the reasoning dimension and in the whole of the scale it has been found that there was a significant difference in the class variable.

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### Introduction

Many philosophical trends and teaching approaches have come up through education programs from past to present. General perspectives of these programs and approaches were formed, based on factors such as instructor, leaner and social expectations. Currently, even though there is a similar structure, the learner factor is prominently reckoned.

The adoption of teaching programs, configured from the learner perspective should not indicate that possible obstacles in teaching activities are eradicated. On the contrary, more time and effort would be needed especially for in-class teaching for trying to consider individual differences, especially in-class teaching. As Philips and Soltis (2005:9) also suggested in this process, the question of "how learners learn something new" should be the main structure. Approaching this question from a new perspective, Dewey's (2007:21) view summarized as "the gap between the products intended for adults and youngsters' experiences and skills are so huge that this makes it impossible for students being actively involved in the development of the material to be taught" advises us in a way to question the role of adults which we can replace with instructors in the learning process. Bruner (2009:6-8) on the other hand, emphasized the importance of learner dimension by pointing out that the best example for unconscious nature of learning structures was one's learning of his/her mother tongue. Furthermore, by suggesting the view "if all students are supported in using the total of their mental abilities, we will have more of a chance to survive as a

\* Corresponding Author name. Tel.: +90-237-0000-4930

E-mail address: [mtuncer@firat.edu.tr](mailto:mtuncer@firat.edu.tr)

*democracy in this era of technology and social complexity*” he, in a way, centered the future of societies upon individuals.

There is a general understating on behaviors targeted by today’s education activities. By views brought forward on education so far, we may assert the necessity of bringing up individuals who are able to develop their learning skills, who acquired a questioning attitude towards facts and events and who are patient in dealing with problems while using their intellectual substructure. In the literature, among concepts in parallel with this sentence, critical and reflective thinking are also included.

Although reflective thinking and critical thinking are mostly used synonymously, reflective thinking is considered as a part of critical thinking’s analyses and decision making process (Houston Independent School District, 2012). Despite reflective thinking comes up with a new idea and is named in various different ways such as reflection to application, reflection or reflecting application, it is actually based on Dewey (Phan, 2006). According to some sources, however, Schön also stands out as well as Dewey, regarding reflective thinking (Gencer, 2008). Dewey approached reflective thinking from philosophical stand point while Schön approached it from application aspect. (Ersözlu and Kazu, 2011). Schön, admitting Dewey’s way of problem solving, questioning and thinking regarding reflective thinking, he also tried to establish a link between reflection and action.

Dewey (1993) assessed reflective thinking as *“active and continuous thinking of any subject”*. Atay (2003: 54) described reflective thinking as a process and he characterized this process as *“remembering, thinking over and assessing with a particular purpose of any experience”*. Loughran (1996: 13), on the other hand, described reflective thinking with phases such as claim, problem, hypothesis, reasoning and testing.

There are many studies in the literature, on the subject of critical and reflective thinking. Among these, according to Korkmaz (2009), critical inclinations and capabilities of teachers are moderate and variables of teaching level, education level, branch, gender and department don’t play a role on them. In another study, it was determined that reflective thinking activities increased the academic achievements of students in science classes and that positively influenced student behaviors towards science lessons (Tok, 2008a). Akbıyık and Seferoğlu (2006) determined a significant difference between a group with high critical thinking inclination and low critical thinking inclination in favor of the first group in terms of general academic achievement, mathematics, science and social group lessons academic achievements. Duban and Yelken (2010) came to the conclusion that prospective teachers showed reflective teacher inclinations. Şahin (2009) suggested that some teachers could not present their reflective thinking skills and lacked critical reflective thinking skills in general. Additionally, it was determined that reflective thinking activities were influential on the performances of students in the test group (Tok, 2008) and the level of academic achievement was relatively higher in lessons based on reflective thinking activities (Keskinılıç and Sünbül, 2011). Study findings of Ersözlu and Kazu (2011) indicate that while a difference between test and control groups in the knowledge level of activities creating reflective thinking, a significant difference was determined in terms of perception, application and analyses levels. Lee (2005), however, approached reflective thinking from the teacher education perspective and suggested that reflective teacher education could contribute to their development, not only during their education but after their graduation from the program as well.

Education policies have the task to prepare individuals for the future. In the fulfillment of this task, supporting the teaching process with cross sections from the real life would be a tremendous contribution. At this point one may suggest that individuals capable of critical and reflective thinking would be more successful in life. Because, academic achievements are generally considered the predictor of success in life. Since learner’s learning approaches appear as an important factor in determining their academic performances (Phan, 2006), it may well be suggested that learners’ academic achievements can be increased by placing education-teaching activities being structured at the core of reflective thinking activities.

Teachers’ reflective thinking skills are as important as learners’ reflective thinking skills. Teachers’ reflective thinking skills being enhanced will put them in a role model position from the perspective of students and hence, a learning atmosphere where facts and events are analyzed and mental skills are efficiently used is created. The issue that needs to be examined at this point is the condition of teachers or prospective teachers in terms of the described skills. Therefore, the aim of this study is the determination of reflective thinking skills of prospective teachers towards problem solving.

## Method

The study was conducted according to survey model. Karasar (2009:77) describes survey model as a study approach which focuses on portraying what's there the way it is. Büyüköztürk et al. (2008:177) points out that screening models are used in determining characteristics such as interest, attitude, skills and capabilities and that screening models, compared to other study models, are applied on larger sample groups.

## Aim of the Study

The general aim of this study is the evaluation of prospective teachers' reflective thinking skills in terms of problem solving. In parallel with this general aim, it was examined whether there was a significant difference between prospective teachers' reflective thinking skills towards problem solving, in terms of their

- Gender,
- Class of education,
- Department of education

## Population and Sample

Population of the study comprised prospective teachers from Firat University Education Faculty. Scaling was carried by random sampling method and four departments from the concerned faculty were selected. Numbers of samples were 356. However, there were only 229 scale returns with usable data. Status of the samples in terms of gender, class and department are as given in table 1

Table 1: Distribution of samples in terms of Gender, Class and Departments.

		N	%
Gender	Female	123	53,7
	Male	106	46,3
Class	2	113	49,3
	3	87	38,0
	4	29	12,7
Department	Computer & Inst. Technology Teaching (CITT)	64	27,9
	Social Science Teaching (SST)	51	22,3
	Science Teaching (ST)	86	37,6
	Elementary School Mathematics Teaching (ESMT)	28	12,2

As can be understood from the data in the table, half of the samples (45.3%) are males. 113 students were in the second class, 87 students in the third and 29 students were in the fourth class. The reason the first class students were not included in samples was the intention of carrying out this study with students who were knowledgeable in problem solving and reflective thinking.

## Data Collection Tool

As data collection tool in this study, Reflective Thinking Skill Scale Towards Problem Solving which was developed by Kızılkaya and Aşkar (2009) was used. Scale consisted of 14 items and 3 sub-dimensions (Questioning, Evaluating and Causation). Scale is scored according to Likert type 5. The method of scoring was developed as "Always=5", "Mostly=4", "Sometimes=3", "Rarely=2" and "Never=1", considering the frequency of students' realization of the action written in the item. The rise in the total number of scores acquired by the scale should indicate the level of possessing reflective thinking skills. Cronbach alpha coefficients of scale factors were calculated as 73 in questioning factor, 69 in evaluating factor and 71 in causation factor. Cronbach alpha coefficient regarding the whole of the scale is 83.

## Analyses of Data

Data obtained through Reflective Thinking Skill Scale Towards Problem Solving were compared in terms of various variables. In comparison of given answers to the items of the scale, in terms of gender variable, independent samples t test was used while in terms of class and department variables, one way variance analyses (anova) test was used. On which group's behalf the significant differences determined by Anova were, was determined through Tukey HSD test. Furthermore, to determine the correlation between factors forming the scale,

correlation analyses was conducted.

Table 2: Independent samples t test results in terms of gender

Dimension	Gender	N	$\bar{X}$	S.Dev.	Levene test		t test		
					F	Sig.	df	t	Sig.
Questioning	Male	123	11,13	3,41	,245	,621	227	,531	,596
	Female	106	10,91	2,85					
Evaluation	Male	123	11,94	2,78	2,841	,093	227	-,825	,410
	Female	106	12,27	3,27					
Causation	Male	123	8,86	2,40	,689	,407	227	,415	,678
	Female	106	8,70	3,20					
Whole of the scale	Male	123	31,94	7,00	,910	,341	227	,048	,962
	Female	106	31,89	7,66					

According to the independent samples t test results in the table, a significant difference could not be found between prospective teachers' reflective thinking skills levels towards problem solving in scale's questioning dimension ( $t(227) = -.531, p > .05$ ), in evaluation dimension ( $t(227) = -.825, p > .05$ ), in causation dimension ( $t(227) = .415, p > .05$ ) and in the whole of the scale ( $t(227) = .048, p > .05$ ).

Another issue examined in the study was whether there was a significant difference or not between prospective teachers' views regarding Reflective Thinking Skill Scale Towards Problem Solving, in terms of class variable. The results of the anova analyses conducted to clarify this issue are summarized in table 3.

Table 3: Anova analyses results in terms of class variable

Dimension	Class	N	$\bar{X}$		Sum of Sq.	df	Mean of Sq.	F	Sig.	(Diff.)
Questioning	2	113	11,63	B.Grp.	83,850	2	41,925	4,311	,015*	2-3
	3	87	10,54	W.Grp.	2197,871	226	9,725			
	4	29	10,17	Total	2281,721	228				
	Total	229	11,03						Levene (F=,666, Sig=,515)	
Evaluation	2	113	12,61	B.Grp.	99,778	2	49,889	5,694	,004*	2-4
	3	87	11,91	W.Grp.	1980,108	226	8,762			
	4	29	10,58	Total	2079,886	228				
	Total	229	12,09						Levene (F=1,025, Sig=,361)	
Causation	2	113	9,40	B.Grp.	86,779	2	43,390	5,778	,004*	2-3
	3	87	8,11	W.Grp.	1697,159	226	7,510			
	4	29	8,41	Total	1783,939	228				
	Total	229	8,79						Levene (F=,587, Sig=,557)	
Whole of the scale	2	113	33,66	B.Grp.	719,962	2	359,981	7,109	,001*	2-3
	3	87	30,57	W.Grp.	11444,624	226	50,640			2-4
	4	29	29,17	Total	12164,585	228				
	Total	229	31,92						Levene (F=,106, Sig=,900)	

In terms of class variable A significant difference between prospective teachers' views regarding the items of the scale was found in questioning dimension ( $F(2,226)=4.311, p < .05$ ), in evaluation dimension ( $F(2,226)=5.694, p < .05$ ), in causation dimension ( $F(2,226)=5.778, p < .05$ ) and the in the whole of the scale ( $F(2,226)=7.109, p < .05$ ). The difference between the questioning and causation dimensions, determined by Tukey HSD test was between the views of second and third class students. The difference in view determined in evaluation dimension was between second and fourth class students. It was further determined that differences in student views towards the whole of the scale were between second class and third, fourth class students.

The final sub goal of the study was to find out whether there was a significant difference or not between prospective teachers’ reflective thinking skills towards problem solving, in terms of their department of education. Again, anova test was used to examine this issue and results can be found in table 4.

Table 4: Anova analyses results in terms of department variable

Dimension	Dep.	N	$\bar{X}$		Sum of Sq.	df	Mean of Sq.	F	Sig.	(Diff.)
Questioning	CITT	64	10,98	B.Grp.	24,681	3	8,227	,820	,484	
	SST	51	11,03	W.Grp.	2257,040	225	10,031			
	ST	86	11,32	Total	2281,721	228				
	ESMT	28	10,25							
	Total	229	11,03							Levene (F=2,043, Sig.=,109)
Evaluation	CITT	64	12,48	B.Grp.	24,655	3	8,218	,900	,442	
	SST	51	12,31	W.Grp.	2055,231	225	9,134			
	ST	86	11,72	Total	2079,886	228				
	ESMT	28	11,96							
	Total	229	12,09							Levene (F=,066, Sig.=,978)
Causation	CITT	64	8,78	B.Grp.	58,906	3	19,635	2,561	,049*	1-4
	SST	51	9,52	W.Grp.	1725,033	225	7,667			
	ST	86	8,69	Total	1783,939	228				
	ESMT	28	7,75							
	Total	229	8,79							Levene (F=,578, Sig.=,630)
Whole of the scale	CITT	64	32,25	B.Grp.	163,955	3	54,652	1,025	,382	
	SST	51	32,88	W.Grp.	12000,630	225	53,336			
	ST	86	31,74	Total	12164,585	228				
	ESMT	28	29,96							
	Total	229	31,92							Levene (F=,958, Sig.=,413)

According to the obtained findings, a significant difference could not be found between prospective teachers’ views regarding the items in the Reflective Thinking Skill Scale Towards Problem Solving, except in the causation dimension. It was determined that the difference occurred in the causation dimension was between social sciences prospective teachers and elementary school mathematics prospective teachers (F(2,226)=2.561, p<.05).

Correlation analysis was carried out to see the relation between scale’s dimensions. Correlation coefficients between scale dimensions can be found in table 5.

Table 5: Correlation values between dimensions of Reflective Thinking Skill Scale Towards Problem Solving

	Questioning	Evaluation	Causation
Questioning	1		
Evaluation	,579**	1	
Causation	,464**	,417**	1

As can be understood from the correlation values in table 5, a positive and significant correlation was found between all factors. The highest correlation was between questioning and evaluating while the lowest correlation was between causation and evaluation.

**Discussion and Suggestions**

Findings acquired as a result of this study can be summarized as follows;

- In all dimensions of the scale, a significant difference was not determined between prospective teachers’ skill levels of reflective thinking towards problem solving, in terms of gender. This finding contradicts with the finding of Kızılkaya and Aşkar (2009) which indicates that there was a significant difference in terms of gender, in the total score of reflective thinking skills towards problem solving. According to Korkmaz (2009), however, gender is not influential in the level and inclination of critical thinking.

- In terms of the class of education, a significant difference was found between Prospective teachers' views towards the items of the scale in the questioning dimension, evaluation dimension, causation dimension and in the whole of the scale. This finding is in parallel with Korkmaz (2009) study findings.
- In terms of department of education, a significant difference was not determined between answers provided by prospective teachers to the items of Reflective Thinking Skill Scale Towards Problem Solving, with the exception of causation dimension. It was further determined that the difference occurred in the causation dimension was between social sciences prospective teachers and elementary school mathematics prospective teachers.
- Correlation can be described as the measurement of relation between two variables. The obtained result getting closer to null indicates that a lower correlation exists while a result getting closer to +1 or -1 indicates a strengthening correlation (Tuncer, 2005:58; Yılmaz, 2010:166). Between all the factors of the scale, a positive and significant relation was determined and it was found that the highest correlation was between questioning and evaluation dimensions.

Pre-service trainings of prospective teachers are determinant in their professional achievements. Accordingly, raising qualified students is closely associated with qualified teacher training. From this aspect, critical and reflective thinking activities should be included in the raising prospective students. Teachers should be encouraged to allow for approaches which put forth learners' mental activities such as reflective and critical thinking now and then in their classes.

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