

Full Length Research Paper

Pre-service science teachers' reflective thinking skills toward problem solving

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Received 15 April 2015; Accepted 19 May, 2015

The purpose of the present study is to investigate the pre-service science teachers' reflective thinking skills toward problem solving and the effects of gender, grade level, academic achievement, type of graduated high school and father and mother's education level on these skills. The study was conducted through the survey method with the participation of 126 pre-service teachers attending the department of Science Teacher Education of the Education Faculty at Mugla Sitki Kocman University in 2013-2014 academic year. Of the participants, 60 are first-year students and 66 are fourth-year students. In the study, as a data collection instrument, "Scale of Reflective Thinking Skills toward Problem Solving (SRTSPS)" developed by Kızılkaya and Askar was employed and the collected data were analyzed through SPSS 20.0 program package. In the analysis of the data, frequencies and percentages were calculated and t-test and one-way variance analysis (ANOVA) were used. At the end of the study, it was found that the pre-service teachers' reflective skills toward problem solving are low in general; they do not significantly vary depending on gender, grade level, academic achievement, type of graduated high school, mother's education level; however, significantly vary depending on father's education level.

Key words: Academic achievement, father's education level, gender, variance analysis. Desirable qualifications, early childhood, the play experience model.

INTRODUCTION

In today's rapidly developing global world, one of the main goals of education systems is to enhance reflective thinking. John Dewey stresses the importance of problem solving skill involved in modern educational approaches and for the development of problem solving skill, reflective thinking skills of individuals need to be developed. This can be done only with the reformation of already lived experiences and acquisition of new

experiences (Baş, 2013).

In order to understand reflective thinking, first the concept of reflection should be explained. Reflection involves the questioning or criticizing the existence or foundations of the problem during the presentation of the problem (Mezirow, 1991: 105). Critical thinking; on the other hand, according to Dewey (1933), is a recurring process in which information is effectively and

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consistently evaluated based on supportive foundations and assumptions. On the basis of this process lays the determination of the problem, evaluation of the ways of solution to the problem by establishing empathy and designing new solutions in a most effective manner (Basol and Gencel, 2013). According to Pollard (2002), reflective thinking is a state in which the teaching individual is open to development and willing to make evaluation.

Educational theoreticians emphasize the importance of fostering higher level skills such as reflective thinking besides many other skills for the development of problem solving skill (Kuhn, 1990; cited in Bas, 2013).

The basic stages of reflective thinking;

- (I) Determination of the problem
- (II) Reflecting the solution to the problem
- (III) Design of planning for problem solving process
- (IV) Implementation of the designed plan
- (V) Performing evaluation by using reflection
- (VI) And continuing by restarting the process (Basol and Gencel, 2013).

Dewey (1933) contends that the quality of education can only be improved by restructuring it through reflective thinking. The purpose of reflective thinking is to come up with a better solution to a problem encountered; thus, problem solving skill is one of the skills to be possessed by an individual. In this regard, reflective thinking can effectively be observed during problem solving process (Shermis, 1992). Reflective thinking is divided into two by Schön (1983) as reflection in-action and reflection on-action. He emphasized that in reflection in-action, both teachers and students need to conduct in-depth thinking during the process and in reflection on-action, they need to ponder about the planning and teaching of the lesson. While conducting educational and instructional activities, teachers must assume important roles in the use of reflective thinking. Teachers must be able to ask questions to encourage students to discuss different thinking styles (Mc Grath and Higgins, 2006). Teachers having reflective thinking skill can both make use of their students' capabilities and draw their attention to the discussion about different learning styles (Larrivee, 2000). Here, the reflective thinking skill of the teacher is of great importance. Both teachers and students themselves can ask and answer reflective thinking provoking questions such as "What happened?", "How did I feel?", "Why did I do so?", "What could I have done differently?" (Griffin, 2003). In an education system based on reflective thinking, students can set their learning goals and take the responsibility for their own learning. They can even recognize their own mistakes without needing any help, can correct these mistakes, motivate themselves and freely express their opinions about any given topic (Ünver 2003). In Turkey, since 2000, greater importance has been attached to inquiry-based science

teaching in line with the developments observed in teacher training programs in America and thus, teacher training programs aimed to educate teachers both questioning and encouraging their students to question (NRC, 2000). In a great amount of research, inquiry in science teaching is addressed as a process including the provision of opportunities for students to create questions that will lead them to information to be constructed, construction of the research process, reporting of the results and sharing of the collected information with others (Hsiao-Lin et al., 2005).

Reflective thinking, like problem solving skill, is one of the skills that can contribute to the development of thinking (Kızilkaya and Askar, 2009). As well as being a skill matching up with many higher thinking skills such as critical thinking and problem solving, reflective thinking can also motivate an individual to solve a problem by using different problem solving paths (Yorulmaz, 2006). In this regard, it is clear that problem solving skill and reflective thinking are closely associated with each other. Though there is a great deal of research conducted on reflective thinking skills, this research mostly focuses on the level of reflective thinking skills of participants, their effects on other skills and their relationship with some demographic features. Lie (2007) conducted a study with the participation of 391 students aged at 16-26 in Singapore to investigate the effect of problem-based learning on the students' reflective thinking levels (Kember et al., 2000). It was concluded that critical thinking skills and reflective thinking skills can be enhanced through reflective thinking instruction. In a study aiming to investigate the classroom teachers' reflective thinking tendencies throughout their science and technology teaching, Ocak et al., (2013) concluded that the teachers continuing their master's studies have higher levels of reflective thinking skills than those of the teachers not doing their master degree. Koksal and Demirel (2008) conducted a study on 12 pre-service classroom teachers to determine the effect of the pre-service teachers' reflective thinking tendencies on the stages of designing, implementation and evaluation of teaching process. They concluded that reflective thinking tendency makes positive contributions to these three stages of teaching process. Duban et al. (2010) conducted a study involving 315 pre-service teachers to determine the participants' reflective thinking tendencies and elicit the similarities between the characteristics of the teacher in their minds and those of the reflective teacher. It was concluded that the pre-service teachers' personal and professional characteristics and the teaching characteristics they want to possess show parallelism with the characteristics of the reflective teacher. Sahin (2011) investigated the reflective thinking tendencies of 102 first-year and fourth-year pre-service Turkish Language teachers and found that the fourth-year students have higher reflective thinking tendencies than the first-year students and gender does not have a

significant effect on reflective thinking tendencies. Durdukoca and Demir (2012) conducted a study on 256 elementary school teachers and reported that the teachers' reflective thinking levels are high and subject area, length of service in the profession and gender do not significantly affect their reflective thinking tendencies. Bakioglu and Dalgic (2013) aimed to determine the problems encountered by Turkish and Danish school directors in the utilization and implementation of reflective thinking.

The study was conducted on 24 secondary school directors from Istanbul and 13 secondary school directors from Copenhagen and detected some internal and external obstacles. Internal obstacles are not having a promotion, lack of foreign language competency, willingness to establish authority and problems encountered in class and external obstacles are communication culture, information concealing, lack of sharing, centralized management, continuous renewal of the system, excessive workload and indifference demonstrated by parents.

Reflective thinking level of pre-service teachers, development of reflective thinking and different dimensions of reflective thinking have become the important issues of research in recent years in Turkey. In teacher training programs, though theoretically one of the objectives is stated to be to educate teachers who can think reflectively, in practice, it has been overlooked to a great extent; thus, there is a great need for research on this issue.

Moreover, one of the important skills to be possessed by an individual is problem solving skill and reflective thinking can make some contribution to the development of problem solving skill (Shermis, 1992). Therefore, it is of great importance for pre-service teachers to believe in the importance of reflective thinking skills including asking questions and conducting inquiry (Desouza and Czerniak, 2003). Thus, teacher training institutions must impart skills of thinking reflectively and encouraging reflective thinking to pre-service teachers (Liou, 2001). In this regard, the current study was conducted to investigate reflective thinking skills oriented to problem solving. Thus, the purpose of this study was to determine the level of pre-service science teachers' reflective thinking skills toward problem solving and to investigate the effect of gender, grade level, academic achievement, type of graduated high school, mother and father's education level on their reflective thinking skills. For this purpose, answers to the following sub-questions were sought:

1. What is the level of the pre-service science teachers' reflective thinking skills toward problem solving?
2. Do the pre-service science teachers' reflective thinking skills vary significantly depending on;

a) Gender

- b) Grade level
- c) Academic achievement
- d) Type of graduated high school
- e) Mother's education level
- f) Father's education level?

METHODOLOGY

In the present study, employs the survey method. The purpose is to determine the pre-service science teachers' reflective thinking skills toward problem solving. As the survey method is usually employed to determine the attitudes, beliefs and opinions of a selected group in relation to a certain issue (McMillan and Schumacher, 2006: 25), it was determined to be the basic research design in the current study. In the collection of the data, "Scale of Reflective Thinking Skills toward Problem Solving" and an Information Form developed to elicit the demographic features of the participants were used. The study was conducted with the participation of 126 pre-service teachers attending the department of Science Teacher Education at the Education Faculty of Mugla Sitki Kocman University in 2013-2014 academic year. Of the participants, 60 are first-year students and 66 are fourth-year students.

Instruments

Scale of Reflective Thinking Skills toward Problem Solving (SRTSPS)

The scale developed by Kızılkaya and Askar (2009) comprised the sub-dimensions of questioning, causation and evaluation and 14 items designed in 5-point Likert type. The items belonging to the sub-dimensions are presented in Table 1. In the original scale, Cronbach alpha internal consistency coefficient was calculated to be 0.83.

Data analysis

All of the items in the Scale of Reflective Thinking Skills toward Problem Solving are positive and the answer alternatives to the items are "Always", "Often", "Sometimes", "Rarely", "Never". The scores assigned to the alternatives are; 5 points for "Always", 4 for "Often", 3 for "Sometimes", 2 for "Rarely" and 1 for "Never". The total score of the scale is the sum of the scores taken from 14 items. Higher score means higher level of reflective thinking skills toward problem solving. The lowest score to be taken from the scale is 1 and the highest possible score is 70. In this regard, when the score taken from the scale is between 14 and 32, it means the participant's level of reflective thinking skills toward problem solving is low; when it is between 33 and 51, it means the level is medium and when it is 52-70, it means the level is high. The data collected through the administration of SRTSPS were analyzed by using SPSS 20.0 program package. Whether the pre-service teachers' reflective thinking skills toward problem solving vary significantly depending on gender and grade level variables was tested with t-test and whether they vary significantly depending on academic achievement, type of graduated high school and mother and father's education level was tested with One Way Variance (One Way ANOVA) analysis.

RESULTS

In this section, the findings related to the sub-problems of

Table 1. Sub-dimensions and items of SRTSPS (Kızılkaya and Askar, 2009).

Sub-dimension	Item No	Items
Questioning	1	When I cannot solve a problem, I ask questions to myself to understand why I cannot solve it.
	3	I try to find a better way of solving by questioning the paths followed by my peers to solve the problem.
	7	While solving a problem, I ask questions to myself to find different ways of solving the problem.
	9	When I read a problem, I think about which information I need for solution.
	13	When I read a problem, I ask questions to myself to determine what is given and required.
Evaluation	2	After solving a problem, I think about a better solution.
	4	I evaluate the possible solutions one by one to find a better solution to the next problem.
	6	When I have solved a problem, I go over and evaluate the operations I have performed.
	10	After solving a problem and finding the result, I check the operations I have performed.
	14	After solving a problem, I compare my solution with the solutions of my peers and evaluate my solution.
Causation	5	While solving a problem, I carefully think about why I perform which operation.
	8	While solving a problem, I think about the reasons for the operations and try to establish a connection with the result I have found.
	11	When I read a problem, I think about the problem I have previously solved and create connections between them based on similarities and differences.
	12	While solving a problem, I perform each operation by thinking previous and next stages.

Table 2. Pre-service teachers' reflective thinking skills toward problem solving.

Reflective thinking skills toward problem solving					
Low		Medium		High	
N	%	N	%	N	%
73	57.9	52	41.3	1	.8

Table 3. T-test results of the pre-service teachers' SRTSPS total scores depending on gender variable.

Gender	N	\bar{X}	S	sd	t	p
Female	91	31.24	6.64	124	.152	.287
Male	35	31.03	8.08			

the study are presented in tables and interpreted.

Findings relating the first sub-problem

The findings related to the levels of the pre-service teachers' reflective thinking skills toward problem solving are presented in Table 2.

In Table 2, the distribution of the pre-service teachers based on their scores taken from SRTSPS is seen. When the total scores taken from the scale are evaluated, it is seen that 57.9% of the pre-service teachers possess "low" level of reflective thinking skills, 41.3% have "medium" level of reflective thinking skills and 8% have "high" level of reflective thinking skills. Thus, it can be argued that in general the pre-service teachers have low level of reflective thinking skills toward problem solving.

Findings relating the second sub-problem

In this section, whether the pre-service reflective thinking

skills toward problem solving vary significantly depending on gender, grade level, academic achievement, type of graduated high school and mother and father's education level was tested and findings are presented in tables.

Findings related to gender

Results of t-test conducted to analyze whether the pre-service teachers' scores taken from SRTSPS vary significantly depending on gender variable are presented in Table 3.

As can be seen in Table3, 19 of the participants are females and 35 are males. The pre-service teachers' reflective thinking skills toward problem solving do not vary significantly depending on gender [$t_{(124)} = .152, p > .05$]. Though there is no gender-based statistical difference, it can be argued that the female participants' reflective thinking skills toward problem solving ($\bar{X} = 31.24$) are a bit higher than those of the male participants ($\bar{X} = 31.03$).

Table 4. T-test results of the pre-service teachers' SRTSPS total scores depending on grade level variable.

Grade level	N	\bar{X}	S	sd	t	p
1 st year	60	31.75	6.82	124	.863	.390
4 th year	66	30.67	7.23			

Table 5. Arithmetic means and standard deviations of the pre-service teachers' SRTSPS total scores according to academic achievement

Academic achievement	N	\bar{X}	S
3.00 and higher	20	28.35	6.70
2.00-2.99	86	31.45	6.84
1.80-1.99	12	31.33	7.64
1.79 and lower	8	35.13	7.75

Findings related to grade level

Results of t-test conducted to analyze whether the pre-service teachers' scores taken from SRTSPS vary significantly depending on grade level variable are presented in Table 4.

As can be seen in Table4, 60 of the participants are first year students and 66 are fourth year students. The pre-service teachers' reflective thinking skills toward problem solving do not vary significantly depending on grade level variable [$t_{(124)} = .863$, $p > .05$]. Yet, in the table, it is seen that first year students' reflective thinking skills toward problem solving ($\bar{X} = 31.75$) are more positive than those of the fourth year students ($\bar{X} = 30.67$).

Findings related to academic achievement variable

Whether the pre-service teachers' reflective thinking skills toward problem solving vary significantly depending on academic achievement was tested with one way variance analysis and the findings are presented in Tables 5 and 6.

As can be seen in Table 5, 8 of the participants have a grade point average of 1.79 or lower, 12 have a grade point average ranging from 1.80 to 1.99 and 86 have a grade point average ranging from 2.00 to 2.99 and 20 have a grade point average of 3.00 or higher. Variance analysis was conducted to test whether the differences among the arithmetic means are statistically significant or not and the findings are presented in Table 5.

The analysis results presented in Table6 show that the pre-service teachers' reflective thinking skills toward problem solving do not significantly vary depending on academic achievement [$F_{(3-122)} = 2.01$, $p > .05$]. That is, academic achievement levels of the students do not

significantly affect their reflective thinking skills toward problem solving.

Findings related to type of graduated high school

Whether the pre-service teachers' reflective thinking skills toward problem solving vary significantly depending on type of high school graduated was tested with one way variance analysis and the findings are presented in Tables 6 and 7.

As can be seen in Table 7, 2 of the participants are Science High School graduates, 35 are Anatolian / Anatolian Teacher Education High School graduates, 80 are Normal High School graduates and 9 are the graduates of other high schools. Variance analysis was conducted to test whether the differences among the arithmetic means are statistically significant or not and the findings are presented in Table 8.

As can be seen in Table 8, the pre-service teachers' reflective thinking skills toward problem solving do not vary significantly depending on type of graduated high school [$F_{(3-122)} = .685$, $p > .05$]. Therefore, it can be argued that type of graduated high school does not have a significant effect on reflective thinking skills toward problem solving.

Findings related to mother's education level

Whether the pre-service teachers' reflective thinking skills toward problem solving vary significantly depending on mother's education level was tested with one way variance analysis and the findings are presented in Tables 9 and 10.

As can be seen in Table 9, 7 of the pre-service teachers have mothers who are graduates of university/post-graduate, 19 have high school graduate mothers, 18 have secondary school graduate mothers, 73 have elementary school graduate mothers and 9 have mothers who are graduates of others; that is, they are illiterate or not graduates of any formal education institutions. Variance analysis was conducted to test whether the differences among the arithmetic means are statistically significant or not and the findings are presented in Table 10.

As can be seen in Table10, the pre-service teachers' reflective thinking skills toward problem solving do not vary significantly depending on mother's education level [$F_{(4-121)} = .706$, $p > .05$]. Therefore, it can be argued that mother's education level does not have a significant effect on the pre-service teachers' reflective thinking skills toward problem solving.

Findings related to father's education level

Whether the pre-service teachers' reflective thinking skills toward problem solving vary significantly depending on

Table 6. ANOVA results of the pre-service teachers' SRTSPS scores according to academic achievement .

Source of variance	Sum of squares	sd	Mean of squares	F	p
Between-groups	291.396	3	97.13		
Within-groups	5891.406	122	48.29	2.01	.116
Total	6182.802	125			

Table 7. Arithmetic means and standard deviations of the pre-service teachers' SRTSPS total scores according to type of graduated high school

Type of high school	N	\bar{X}	S
Science High School	2	34.50	.70
Anatolian/ Anatolian Teacher Education High School	35	32.37	6.91
Normal High School	80	30.56	7.29
Others	9	31.33	5.63

Table 8. ANOVA results of the pre-service teachers' SRTSPS scores according to type of graduated high school

Source of variance	Sum of squares	sd	Mean of squares	F	p
Between-groups	102.443	3	34.148		
Within-groups	6080.359	122	49.839	.685	.563
Total	6182.802	125			

Table 9. Arithmetic means and standard deviations of the pre-service teachers' SRTSPS total scores according to mother's education level.

Mother's education level	N	\bar{X}	S
University/Post-graduate	7	28.86	7.38
High School	19	32.79	8.54
Secondary School	18	32.44	7.06
Elementary School	73	30.62	6.37
Others	9	31.67	8.97

father's education level was tested with one way variance analysis and the findings are presented in Tables 11 and 12. As can be seen in Table 11, 18 of the pre-service teachers have fathers who are graduates of university/post-graduate, 37 have high school graduate fathers, 24 have secondary school graduate fathers, 44 have elementary school graduate fathers and 3 have fathers who are graduates of others; that is, they are illiterate or not graduates of any formal education institutions. Variance analysis was conducted to test whether the differences among the arithmetic means are statistically significant or not and the findings are presented in Table 12.

As can be seen in Table 12, the pre-service teachers' reflective thinking skills toward problem solving vary significantly depending on father's education level [$F_{(4, 121)} = 2.498, p < .05$]. In order to determine from which group this difference stems, Scheffe test was conducted and it was found that the reflective thinking skills toward problem solving of the pre-service teachers whose fathers are high school graduates ($\bar{X} = 34.14$) are more positive than those of the pre-service teachers whose fathers are elementary school graduates ($\bar{X} = 29.66$). Thus, it can be claimed that father's education level has a significant influence on the pre-service teachers' reflective thinking skills toward problem solving.

DISCUSSION

The purpose of the present study is to investigate the pre-service science teachers' reflective thinking skills toward problem solving and the effects of gender, grade level, academic achievement, type of graduated high school and father and mother's education level on these skills. At end of the study, it was found that in general the pre-service teachers' reflective thinking skills toward problem solving are low. The pre-service teachers' low level of reflective thinking skills oriented to problem

Table 10. ANOVA results of the pre-service teachers' SRTSPS scores according to mother's education level.

Source of variance	Sum of squares	Sd	Mean of squares	F	p
Between-groups	141.082	4	35.270		
Within-groups	6041.72	121	49.932	.706	.589
Total	6182.802	125			

Table 11. Arithmetic means and standard deviations of the pre-service teachers' SRTSPS total scores according to father's education level.

Father's education level	N	\bar{X}	S
University/Post-graduate	18	30.06	7.35
High School	37	34.14	6.79
Secondary School	24	30.54	6.98
Elementary School	44	29.66	6.49
Others	3	29.00	10.00

Table 12. ANOVA results of the pre-service teachers' SRTSPS scores according to father's education level

Source of variance	Sum of squares	sd	Mean of squares	F	p	Significant difference
Between-groups	471.688	4	117.922			
Within-groups	5711.113	121	47.199	2.498	.046	High school-Elementary school
Total	6182.802	125				

solving may be associated with their shortcomings in their skills of questioning their goals, monitoring the results of their research, short-term and long-term thinking, considering external feedbacks together with their own observations, openness to criticisms and suggestions, following innovations and developing oneself and investing more time and effort on the problem and the solution to the problem (Norton, 1994). That is, during the undergraduate education, pre-service teachers should be encouraged to question their competency in the above mentioned skills. In addition to this, these skills can be imparted to teachers after they start to work as actual teachers through in-service training. This finding concurs with the findings of the study conducted by Baki et al. (2012) on pre-service elementary school mathematics teachers. However, there are some findings reported in literature not complying with this finding. In a study conducted by Aydın and Celik (2013) with the participation of pre-service social studies teachers and in a study carried out by Ergüven (2011) on teachers, it was found that the participants have high levels of reflective thinking skills. The present study revealed that gender is not an influential factor on the development of these skills. While Ergüven (2011) stated that gender does not significantly affect teachers' reflective thinking skills, Aydın and Celik (2013) stress that gender results in significant differences

in favor of female participants. Another finding of the current study is that grade level does not have significant influence on the pre-service reflective thinking skills toward problem solving. There are some studies supporting this finding in literature. Aydın and Celik (2013) conducted a study on the pre-service social studies teachers and concluded that grade level does not significantly affect the pre-service teachers' reflective thinking skills. Sahin (2011) investigated the pre-service Turkish Language teachers' reflective thinking tendencies and concluded that the reflective thinking tendencies of the fourth year students are higher than those of the first year students. This finding is different from the relevant finding of the present study. The present study also found that academic achievement does not have a significant effect on the pre-service teachers' reflective thinking skills toward problem solving. Ersozlu and Kuzu (2011) investigated the effect of the activities implemented within 5th grade social studies course to develop students' reflective thinking on students' academic achievement and concluded that these activities do not result in significant differences in the participants' information levels. This supports the finding of the current study. However, there are some studies reporting different findings in literature. Bas (2012) concluded that activities performed to enhance seventh graders' reflective thinking

skills in English course made positive contributions to students' academic achievement. Moreover, Bas (2013) investigated the correlation between the elementary school students' reflective thinking skills and their science and technology course achievement and reported a high correlation. It was found that type of graduated high school does not significantly affect the participants' reflective thinking skills. Dolapcioglu (2007) also found that there is no significant correlation between classroom teachers' reflective thinking levels and type of graduated high school.

This finding concurs with the present study. In the current study, it was found that the pre-service teachers' reflective thinking skills toward problem solving do not vary significantly depending on mother's education level but vary significantly depending on father's education level.

Thus, it can be argued that with increasing father's education level, reflective thinking skills develop. Aydın and Celik (2013) also found that mother's education level does not significantly affect the pre-service social studies teachers' reflective thinking skills and this finding concurs with the finding of the current study. Problem solving oriented reflective thinking skills of the pre-service teachers were found to be low in general and gender, grade level, academic achievement, type of the graduate high school and the mother's education level were found to be not leading to significant differences in these skills.

Conclusion

Both problem solving skills and reflective thinking skills are important for individuals to deal with problems they are confronted with. In this connection, the present study investigated the pre-service science teachers' reflective thinking skills toward problem solving and the effects of gender, grade level, academic achievement, type of graduated high school and mother and father's education level on these skills and following conclusions were reached.

1. The pre-service science teachers' reflective thinking skills toward problem solving were found to be low.
2. The pre-service teachers' reflective thinking skills toward problem solving do not significantly vary depending on gender, grade level, academic achievement, type of graduated high school and mother and father's education level.
3. Father's education level was found to be a factor significantly affecting the pre-service teachers' reflective thinking skills toward problem solving and the reflective thinking skills of the pre-service teachers whose fathers are high school graduates are more positive than those of the pre-service teachers whose fathers are elementary school graduates.

Limitations

The present study is limited to 1st and 4th year students from the Department of Science Teaching at the Education Faculty of Mugla Sitki Kocman University. The collected data of the study are limited to the administration of "The Scale of Reflective Thinking Skills toward Problem Solving" and "Demographic Features Form" developed by the researcher.

RECOMMENDATIONS

In this study, as the pre-service teachers' problem solving oriented reflective thinking skills were found to be low, it was thought that incorporation of the activities encouraging them to ponder about planning and teaching of a topic and to question the topic to be taught by asking questions such as ("What happened?", "Why did I do so/ was it done so?") into teacher training programs can contribute to the development of problem solving oriented reflective thinking and thus, they can better produce solutions to the problems they encounter. The pre-service teachers having high level of reflective thinking skills can set their own goals, take responsibility for their learning, motivate themselves and recognize and correct their mistakes. This will also enhance the quality of student-centered learning. For an in-depth analysis of the issue, future research may investigate which variables affect students' reflective thinking skills and how they affect by using different measurement instruments.

Conflict of Interests

The author has not declared any conflict of interests.

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