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Abstract. *In this study, a teaching program was designed to improve preservice teachers' self-efficacy about the use of alternative assessment. The teaching program has three stages: workshop, observation, and teaching. Preservice teachers' opinions about the contribution of the teaching program to their professional development and the effect of the program on their self-efficacy were determined. Data was collected through a survey, students' reflective journal, and interview. Results show that preservice teachers had understanding about alternative assessment and positive opinions about the teaching program. Furthermore, their self-efficacy toward use of the alternative assessment improved. The teaching program had positive contributions to preservice teachers' professional development.*

Key words: *alternative assessment, preservice teacher education, self-efficacy.*

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IMPROVING PRESERVICE SCIENCE TEACHERS' SELF-EFFICACY ABOUT THE USE OF ALTERNATIVE ASSESSMENT: IMPLICATION FOR THEORY AND PRACTICE

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Introduction

In recent years, ideas about classroom assessments have undergone important changes (NRC, 1996; Rulison, 2012). Reform efforts have challenged the use of traditional assessment (Anderson, 1998). The studies have established limitations of traditional assessment: too much dependence on traditional exams, conflict between grades and assessment criteria, lack of feedback, the fact that assessment tasks consist of insufficient intellectual tests, and that they cannot meet the demands in different study areas lead to important problems (QAA, 2003; Boud & Falchikov, 2006). These narrow-scale exams cannot reflect the success or failure of the student and are insufficient in measuring higher skills of the students, further they cannot determine their mental schemes (Enger & Yager, 1998; Shepard, 2000). When all these limitations are considered, new assessment methods are needed, in addition to traditional assessment methods in order to evaluate students.

A new assessment culture, called alternative assessment approaches is expressed as nontraditional approaches that give information about what the students know and can do, determine what they know about the subject, and evaluate their performance (Gummer & Shepardson, 2001; Pierce & O'Malley, 1992). Information gained from teacher observation, student projects, performances, portfolios, and open-ended problems (Feuer & Fulton, 1993; Wortham, 1995) are referred to as alternative assessment because they are valuable in themselves and relevant activities and also involve the completion of tasks that are found in real life situations (cited in Culbertson, 2000, p. 32). There are many advantages of alternative assessment which determine strong and weak points of students (Owings & Follo, 1992), increase students'



interest and enthusiasm (Cohen, 1995; Maslovaty & Kuzi, 2002), give students' a chance to assess themselves, and guide the process of learning by reflecting students' development throughout the process (Wiggins, 1993). There is powerful evidence that alternative assessment can improve student learning and achievement (Shepardson & Adams, 1996), it is just as clear that sustained professional development for teachers is required if they are to improve this aspect of their assessment (NRC, 2000). In addition, many researchers have suggested that preservice teachers' understanding and skills about the use of alternative assessment should be improved (Culbertson, 2000; Yıldırım, 2004; Siegel & Wissehr, 2011).

Self-Efficacy

According to Bandura's social cognitive theory, behavior of humans is affected by their own cognitive process. Individuals use their existing knowledge and beliefs to understand external situations and events, as a result, they develop expectations that play a large role in determining their future behavior. Self-efficacy is a key element of this theory (Palmer, 2011). It can be defined as the belief in one's capabilities to organize and supervise the course of action needed for managing prospective situations. This belief affects our choices, efforts shown for a task, our resistance against a difficulty, and how we feel (Bandura, 1995). Individuals having strong beliefs about their self-efficacy show great effort to achieve something, do not easily give up when they encounter negativities and are insistent and patient (Pajares, 1996).

There are four factors that affect an individuals' self-efficacy. These factors are: mastery experiences, vicarious experiences provided by social models, social persuasion, as well as physiological and affective states of the individual (Bandura, 1997). Teacher self-efficacy can identify individual teachers' beliefs in their own ability to plan, organize, and carry out activities that are required to attain given educational goals (Skaalvik & Skaalvik, 2010, p. 1059). Mastery experiences are the most important factors influencing self-efficacy (Bandura, 1997; Milner & Hoy, 2003; Zhang & Burry-Stock, 2003). The successful actual classroom teaching practices that preservice teachers perform refer to mastery experiences (Bautista-Uludag, 2011). Another factor affecting self-efficacy is vicarious experiences (Bandura, 1997). Schunk and Hanson (1989) have stated that teacher and peer models increase the self-efficacy of the students. Preservice teachers gain by observing other teachers model the successful classroom teaching practices (Bautista-Uludag, 2011). Another factor, called social persuasion, can be defined as feedback by other people about the person's performance as to whether he/she can complete the task successfully (Coleman & Karraker, 1997). This occurs when preservice teachers receive feedback and encouragement from his or her peers, course instructors, supervisors and/or cooperating teachers on his/her teaching practice (Palmer, 2011; Bautista-Uludag, 2011). Physiological and affective states are also known to be another factor affecting self-efficacy (Bandura, 1997); referring to how preservice teachers' respond to their own stress and anxiety regarding teaching (Bautista-Uludag, 2011). Sutton and Wheatley (2003) have emphasized the effect of positive emotions on self-efficacy and alleged that positive feelings increase self-efficacy and negative feelings decrease it.

Knowledge and Self-Efficacy about Alternative Assessment

Many researchers have stated that alternative assessment has not permeated common teaching practice in classrooms. One of the reasons for this is that teachers have a lack of understanding and experience (Cheng, 2006; Flowers, et al., 2005; Ogan-Bekiroğlu, 2009). Teachers' limited understanding and experience about alternative assessment can be sourced from teacher education programs. Volante and Fazio (2007) examined Canadian preservice teachers' assessment literacy. They stated that preservice education programs do not provide a deep enough understanding of various approaches to classroom assessment and explained that most candidates preferred summative purposes of assessment and only a minority expressed formative purposes. Also, Şenel-Çoruhlu, Er-Nas and Çepni (2009) indicated that science and technology teachers had little understanding and skill in the use of alternative assessment.

Knowledge and experience of the individuals affect their self-efficacy (Bandura, 1986). Volante and



Fazio (2007), Şaşmaz-Ören, Ormancı and Evrekli (2011), Siegel and Wissehr (2011) have stated that in their studies preservice teachers have lack of knowledge and low level of self-efficacy about alternative assessment. Rulison (2012) has indicated that in his study survey scores show that teachers were very confident in their abilities to use a variety of instructional strategies and assessments. However, their perceived level of efficacy dropped significantly when faced with an actual performance-based task. Wortham (1995) noted that teachers should be knowledgeable and comfortable about alternative assessment because assessment procedures and terminology, when not understood completely may lead to a lack of confidence and support in terms of both the teacher and the school, which may pose an obstacle to reforms in assessment. Cheng (2006), Flowers et al. (2005), Volante and Fazio (2007), Buldur and Tatar (2009) have suggested that in-service and preservice teachers should be instructed about the use of alternative assessment in classroom practices.

Purpose of the Study and Research Questions

This study is part of a larger study which aims to improve preservice science teachers' understanding and self-efficacy toward the use of alternative assessment. Within this framework, preservice science teachers attended the teaching program which was designed by researchers. The effect of the teaching program on preservice teachers' understanding and self-efficacy toward the use of alternative assessment were investigated. In this article, preservice teachers' opinions about the contribution of the teaching program to their professional development and the effect of the teaching program on their self-efficacy are presented. The following research questions were examined:

- i. What were preservice teachers' opinions about the contribution of the teaching program to their professional development?
- ii. What were preservice teachers' self-efficacy before, during and after the teaching program?

Methodology of Research

In this study mixed method was used. This method is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration (Johnson, Onwuegbuzie & Turner, 2007).

Participants

Twenty-five preservice science teachers attended this study. Thirteen participants were female and twelve of them were male. All candidates volunteered to participate in this study. All of them were seniors at a state university in Turkey. It might be useful to give some information about the science teacher education program in Turkey. The program lasts four years. During the first two years preservice teachers mainly complete field courses (physics, chemistry, biology and laboratory courses). Pedagogical content courses are dominant in the following two years. Candidates increase their general pedagogical knowledge and pedagogical content knowledge in these courses. They take teaching practicum courses in which they make observations and practice teaching in elementary science classes in their last year.

Data Collection

The qualitative and quantitative data of the study were gathered through the survey, students' reflective journal and the interview form developed by the researchers.



Self-Efficacy towards Using Alternative Assessment Scale (SUAAS)

Quantitative data were obtained by using SUAAS (Buldur & Tatar, 2011). SUAAS is a Likert type survey consisting of 15 positive and 11 negative items, making a total of 26. The survey has three sub-factors: (i) self-efficacy toward using sources, (ii) self-efficacy toward the challenges, and (iii) self-efficacy toward using techniques. Cronbach alpha values of the sub-factors are 0.71, 0.86, and 0.88 respectively and Cronbach alpha value of the survey in general was calculated as 0.89. SUAAS was used three times before, during, and after the instruction.

Students' Reflective Journal

Preservice science teachers answered questions in the journal to explain their opinions after the second stage. They stated their views about the contribution of the practices of the workshop and observation stages to their professional development. Students' reflective journal have four open-ended questions. These questions are below:

1. What did you learn about the alternative assessment in the workshop?
2. What is your opinion about the sufficiency of the workshop?
3. What more do you want to learn about alternative assessment?
4. What are the contributions of your observations on your professional development?

Interview form

Through the semi-structured interview, preservice teachers' opinions about the contribution of teaching practices to their professional development were examined. Moreover, their opinions were taken regarding their self-efficacy. In this study, researchers examined two questions in the interview form. These questions are as follows:

1. What are the contributions of your teaching practices on your professional development?
2. How would you evaluate your self-efficacy toward the use of alternative assessment before and after the teaching program?

The Content of the Teaching Program

The research was conducted during the spring semester in the 2008–2009 academic year. This study lasted for twenty-seven weeks. A teaching program which has three stages was applied.

Workshop stage: Before starting the workshop stage, SUAAS was applied to determine preservice teachers' self-efficacy toward the use of alternative assessment as a pre-test. The workshop, which lasted for six weeks (two hours a week), was designed to increase preservice teachers' understanding about alternative assessment. Alternative assessment was taught to the participants by explanation, discussion, and practices. Participants were given the opportunity to gain understanding and experiences about several techniques (i.e. concept maps, rubrics, K-W-L charts, and Vee diagrams). They prepared some materials working individually or with peers in the workshop. Class discussions were held every week. All materials were examined by researchers and all participants at the end of the each lesson. Missing parts and errors in materials were discussed and feedback was given.

Preservice teachers' observation stage: In this stage, preservice teachers developed opinions concerning how these techniques are used by science teachers. They observed science teachers' practices for six weeks (four hours a week). Preservice teachers wrote a report about their observations each week. Researchers and participants discussed preservice teachers' observations in class discussions every week. In class discussions, opinions and suggestions of preservice teachers about the teachers' practice was discussed. At the end of this stage, SUAAS was applied as a mid-test and preservice teach-



ers wrote a reflective journal in order to explain what the contributions of these practices are on their professional development.

Preservice teachers' teaching stage: This stage lasted for ten weeks (six hours a week). Preservice teachers taught science subjects and observed their peers' teaching practices in science classes. Each preservice teacher taught three lessons every lesson lasted 80 minutes. They used different alternative assessment techniques during their teaching process. Before their teaching, guidance was given to them about the techniques to be used. Their teaching practices were videotaped. Afterward, each preservice teacher's videotape was watched with all participants and researchers. Their performances were evaluated by researchers, peers, and preservice teachers made self-assessment. After this stage, SUASS was applied as a post-test, then, a semi-structured interview was done with the participants.

Data Analysis

SPSS 16.0 program was used for the analysis of SUASS. For the comparison of pre-test, mid-test, and post-test scores of the participants, One-way ANOVA was used for related samples. In order to make a comparison among the groups, Bonferroni correction was used.

Descriptive analysis was used for the analysis of students' reflective journal and semi-structured interview data (Strauss & Corbin, 1990). Interview records were transcribed. Students' reflective journal and interview transcripts were read by two researchers. They determined codes for each question and then categorized these codes. They discussed and agreed about their categories. When the categories were defined, researchers analyzed five preservice teachers' data and calculated their agreement percentage (Cohen 1960). Agreement percentage was found at 0.90. According to the range defined by Landis and Koch (1977), the average of the scores from the agreement between the two evaluators was almost in perfect agreement. After that, second author analysed all participants' reflective journals and interview data. When preservice teachers' statements were analysed, it was determined that some participants' statements included more than one code. Thus, the number of participants in to some categories varied in relation to their explanations.

Trustworthiness of the Data

An attempt was made to maintain the trustworthiness of this study by (a) obtaining data from multiple sources, (b) benefiting from the literature and consulting a specialist while preparing the data tools, and (c) checking the consistency of findings generated by different data collection methods. The findings were triangulated through methods, sources, and analyst triangulation (Patton, 1999).

Results of the Research

Results are presented into two headings. In the first part preservice teachers' opinions about the contribution of the teaching program to their professional development is explained. In the second part, self-efficacy of preservice teachers is presented.

Preservice Teachers' Opinions about the Contribution of the Teaching Program to Their Professional Development

Participants' opinions about the contribution of the teaching program were analysed after every stage of the instruction.

Preservice Teachers' Opinions after the Workshop Stage

In the workshop, participants learned information about alternative assessment techniques and practiced how to prepare and use these. Their opinions about what they learned in the workshop are



shown in Table 1.

Table 1. Preservice teacher's opinions about the contribution of the workshop on their professional development.

Category	n	%	Sample Statements
Importance of alternative assessment	10	40	"I gained knowledge on issues such as that these techniques enhance learning, increase interest, ensure objective assessment, help to find out misconceptions" (S21).
Alternative assessment techniques	9	36	"I gained knowledge about grid, flash cards, rubric, branching tree, and KWL charts which at first were really strange and I had no idea about them" (S4).
Use of alternative assessment techniques	8	32	"I learned what alternative assessment techniques are and how they are used in classes" (S3).
Differences between alternative and traditional assessment	3	12	"Before the course, I thought that some of these techniques were in traditional learning (concept map, written report). I got rid of this mistake thanks to this course" (S21).

Preservice teachers gained knowledge and experiences about alternative assessment in the workshop. They explained that they learned the effects of alternative assessment on students' learning, different kinds of techniques, how to prepare and use these techniques in classes, and they compared differences between alternative and traditional assessment techniques. After the workshop, participants evaluated the sufficiency of the workshop. Their opinions were classified into three categories. Their opinions about the sufficiency of the workshop are shown Table 2.

Table 2. Preservice teachers' opinions about the sufficiency of the workshop.

Categories	nn	%%	Sample statements
Insufficient	66	224	"The important thing is practicing. Otherwise, knowledge is inadequate." (S2).
Partly Sufficient	112	448	"I have theoretical knowledge about techniques. However, I do not have adequate knowledge about how to apply these techniques in class" (S19).
Sufficient	77	228	"I absolutely think it is sufficient. You can do it once you learn it" (S18).

Participants interpreted the effects of the workshop as beneficial; however, most of them (n=18) expressed that they want to use these techniques in science classes. These results clearly indicated that preservice teachers were aware of their deficiencies and need to develop knowledge and skills about the use of alternative assessment. Preservice teachers were asked more what they want to learn about alternative assessment. Their opinions presented in Table 3.

In summary, preservice teachers had some knowledge about alternative assessment in the workshop. They learned lots of techniques while they were preparing materials. They stated the importance of these techniques on learning and teaching process. They explained the advantages of alternative assessment techniques on the students' learning process. In addition, most of them were aware of their deficiencies and stated that they want to learn the application of these techniques and improve their teaching skills.



Table 3. Preservice teachers' opinions about what they want learn about alternative assessment.

Categories	n	%	Sample statements
Implementation of techniques	13	52	"I would like to apply these techniques in classes. We could apply these in classes, choosing one of them because I do not know how to manage the class while doing these" (S9).
Use of techniques with technological tools	4	16	"I would like to have an alternative assessment technique done through technology and I would like to learn how to prepare it" (S8).
Their effects on students' learning	3	12	"I would like to see what kind of effects there are when alternative assessment techniques are used with students" (S11).

Preservice Teachers' Opinions after the Observation Stage

At this stage, preservice teachers observed to understand how they use alternative assessment in classes. After that, they stated their opinions about teachers' practices in class discussion. They criticized teachers' practices and made some suggestions about the use of alternative assessment. Participants' opinions about what they learned from observations were classified into five categories. It can be seen in Table 4.

Table 4. Contribution of the observation to preservice teachers' professional development.

Categories	n	%	Sample statements
Limited knowledge from the teachers	12	48	"Throughout the observation, I did not see the teacher use alternative assessment techniques. I asked him and he said that he did not know these techniques and did not use any of them" (S12).
Implementation of techniques	4	16	"I learned how to use the concept maps, branching tree, and preparing and evaluating portfolio. I learned it can be more enjoyable through crossword puzzles while teaching some subjects" (S21).
Their effects on students' learning	4	16	"I saw that alternative assessment makes the lessons more enjoyable and motivates the students" (S7).
Necessity of instruction to use these techniques	3	12	"I saw that alternative assessment techniques can be applied only after a long process of instruction" (S13).
The difficulties of using these techniques	2	8	"I saw that using these techniques is difficult and time consuming" (S4).

In this stage, preservice teachers gained perspectives about application of alternative assessment in the learning and teaching process with the observations and class discussions. Class discussions help to improve their opinion. They understood teachers had a lack of information and they needed instruction to improve their understanding. In addition, they observed the effect of these techniques on students and the difficulties of using these techniques.

Preservice Teachers' Opinions after Teaching Stage

In the teaching stage, preservice teachers taught science subjects using different alternative assessment techniques. They prepared lesson plans before teaching. These plans were examined and given feedback by researchers before the teaching practice. Preservice teachers used different alternative assessment techniques to determine students' prior knowledge. Also, they applied some techniques to teach science concepts (e.g. concept maps, drawings, concept cartoons) and assess students' performance with these techniques. Participants' teaching practices were recorded by camera and watched with all participants every week. Researchers and participants made suggestions about teaching practices. After this stage, researchers interviewed the preservice teachers about the contribution of these teaching



practices and reflections to their professional development. Preservice teachers' opinions about what they learned in this stage are given on Table 5.

Table 5. The contribution of the teaching practices to preservice teachers' professional development.

Contributions of teaching practices I have learned....	nn
To increase the students' interest and participation	10
Class management	8
Time management	8
To prepare materials relevant to content	7
To prepare materials relevant to the level of the student	6
To use examples from daily life	6
To identify the students' misconceptions	5
To assess the students' performances	4
To guide the students	3
To facilitate students' learning	2
To use of different sources	2

They gained teaching experience in this stage. They had more difficulties in the first teaching practice, especially class and time management. However, the difficulties decreased in time. They learned how to prepare and apply these techniques in the teaching process. Preservice teachers assessed the contribution of the teaching program to their professional development. All of them mentioned that they did not have any knowledge about alternative assessment before the instruction. They stated that they learned these techniques at the end of the program and they would reinforce their knowledge and skills in time. Some statements of preservice teachers are as follows:

"I did not know anything at the beginning. However, I know how to use almost all of them (techniques) now" (S1).

"I did not know anything about alternative assessment. You taught how to use these techniques. I learned their benefits on students. I noticed a considerable improvement in my knowledge and self-efficacy" (S2).

At the last stage of the teaching program, preservice teachers improved their understanding and self-efficacy about the use of alternative assessment.

Preservice Teachers' Self-Efficacy about the Use of Alternative Assessment

Preservice teachers' self-efficacy toward the use of alternative assessment was determined by using SUAAS before, during, and after the teaching program. Their results are shown in Table 6. There is a meaningful difference between pre-test, mid-test and post-test scores of preservice teachers in the self-efficacy sub-factor of SUAAS's related to using sources [$F(2, 48)=21.36, p<0.01$]. It was found that this significant difference is between pre-test and post-test, mid test and post-test. Preservice teachers stated that they can benefit the facilities of the environment and technology and direct their students toward necessary sources.

It was found that there is a meaningful difference between pre-test, mid-test and post-test scores of preservice teachers related to SUAAS's self-efficacy sub-factor concerning the challenges [$F(2, 48)=5.97, p<0.05$]. It was determined that the difference exists between pre-test and post-test. Participants



indicated that they may have difficulty while preparing, applying, and assessing these techniques in pre-test. However, their beliefs changed in positive way in post-test.

There is also a meaningful difference between the pre-test, mid-test and post-test of preservice teachers related to SUAAS's self-efficacy sub-factor toward using [F (2, 48)=6.40, $p<0.05$]. It was found that the difference exists between pre-test and post-test ($p<0.05$). At the end of the study, participants rely on their knowledge and skills much more and they believed that they overcome the difficulties in this aspect.

Table 6. ANOVA results related to pre-test, mid-test and post-test scores concerning sub-factors of SUAAS.

Sub-factors	Source	Sum of Squares	df	Mean Square	F	p
Self-Efficacy towards Using Sources	Between Subjects	6.545	24	0.273	21.36	0.000
	Within Subjects	6.180	2	3.090		
	Error	6.945	48	0.145		
	Total	19.670	74			
Self-Efficacy towards the Challenges	Between Subjects	13.100	24	0.548	5.97	0.05
	Within Subjects	2.202	2	1.101		
	Error	8.856	48	0.184		
	Total	24.158	74			
Self-Efficacy towards Using Techniques	Between Subjects	13.055	24	0.544	6.40	0.003
	Within Subjects	4.187	2	2.094		
	Error	15.712	48	0.327		
	Total	32.954	74			

1: Pre-Test, 2:Mid-Test, 3: Post-Test

When the findings were examined, it was seen that preservice teachers' scores of SUASS increased considerably at the end of the teaching program. In this study, preservice teachers gained knowledge about alternative assessment, observed the teachers, used these techniques in their own teaching, evaluated themselves and peers' performances, and increased their experiences in discussion with researchers, peers, teachers, and students. It has been found that preservice teachers' self-efficacy has increased more over time. The teaching program was effective in increasing their understanding and self-efficacy about the use of alternative assessment.

Discussion

This study aimed to determine preservice teachers' opinions about the contribution of the teaching program to their professional development and the effect of the teaching program on their self-efficacy. Preservice teachers improved both knowledge and experience as well as enhanced their self-efficacy about the use of alternative assessment with the teaching program. Their self-efficacy toward the use of alternative assessment improved together with their experiences. Successful experiences are important in the development of self-efficacy (Chase, 2001; Milner & Hoy, 2003). Similar to these results, a recent large scale found that when the teachers' experience with assessment increased, they had higher levels of self-efficacy (Zhang & Burry-Stock, 2003).

In this study, a teaching program which has three stages was applied. Practices in all stages aimed to increase preservice teachers' self-efficacy. The program included four factors which affect self-efficacy. Mastery experiences are the most powerful factor of self-efficacy. Preservice teachers gained mastery experiences in all stages. In the workshop stage, researchers taught them how to prepare and use alternative assessment techniques. In the observation stage, they observed how teachers use these techniques in science classes. In the teaching stage, they learned how to use these techniques in the teaching process. According to Palmer (2011), mastery experiences have a strong effect on self-efficacy



when used in the context of a professional development. In our study, these experiences increased participants' self-efficacy.

The second factor to influence self-efficacy is vicarious experiences provided by social models. Vicarious experiences occur through the observation of others succeeding or failing. When a model with whom the observer closely identifies performs well, the efficacy of the observer is enhanced (Oh, 2010). In our study, researchers, science teachers, and peers were models for participants. In the workshop stage, participants observed researchers. In the observation stage, they observed science teachers and interpreted their practices in class discussions. In the teaching stage, they watched peers' teaching practices in the video and discussed their performances. All of these provided vicarious experiences for participants.

Social persuasion is another factor which affects self-efficacy. According to Looney (2003), if individuals are feeling unsure about their capabilities in a given domain, hearing others praise their successes and provide strategies for overcoming challenges can instill the notion that one can achieve in a particular area. Palmer (2011) stated that feedback has great potential to increase teachers' self-efficacy. In this study, positive feedback was used to increase preservice teachers' self-efficacy. In the workshop stage, they prepared some materials and presented them in class. These materials were examined and positive feedback was provided by researchers and peers. Furthermore, the most powerful feedback was given in the teaching stage. At this stage, participants prepared lesson plans. Their plans were examined and feedback was given by the researchers. In addition, preservice teachers' teaching practices were recorded and their performances were assessed by researchers and peers. Positive feedback increased their self-efficacy.

The other factor which effects self-efficacy is physiological and emotional states. In this study, we tried to increase preservice teachers' positive feelings and decrease their fear and stress. In the program, researchers provided an interactive and respectful classroom atmosphere. Participants shared their opinions and feelings in class discussions. In addition, researchers and participants talked about their lesson plan before teaching practices and participants' stress decreased with positive feedback. Furthermore, participants collaborated with researchers and peers. These experiences contributed to increase their self-efficacy. Similarly Khourey-Bowers and Simonis (2004) designed a relaxed and respectful classroom atmosphere in their study. They promoted collaboration among the middle grade teachers, so participants could feel comfortable. This atmosphere helped to enhance their self-efficacy about teaching. In this study, an interactive and respectful class environment, positive feedback, and collaboration increased participants' self-efficacy.

Conclusions and Implications

In brief, the results showed that self-efficacy was increased by the teaching program, and preservice teachers had positive opinions about the teaching program. They gained experience about the use of alternative assessment in science class. Therefore, they increased their self-efficacy toward the use of alternative assessment at the end of the teaching program. The workshop, observation and teaching practices had a strong effect on their understanding and self-efficacy. It is the responsibility of science teacher educators to help to increase preservice science teachers' understanding and skills about alternative assessment. Therefore, some suggestions may be made to teacher educators and researchers.

First, preservice teachers must be provided with professional development opportunities which are based upon alternative assessment. If we want to develop their understanding and self-efficacy, we must provide them with experiences. Preservice teachers should learn alternative assessment and they should use these techniques in the practicum courses. Second, to improve preservice teachers' understanding, science teacher educators, science teachers and preservice teachers should work collaboratively. This collaboration helps to improve preservice teachers' viewpoints about learning, teaching and the assessment process. Finally, alternative assessment should be used in the preservice teacher education program. If science teacher educators implement various alternative assessment techniques in their courses, preservice teachers become familiar to these techniques and begin to change their traditional assessment opinions.



This study also had some limitations, which should be taken into consideration when interpreting its results. First, only twenty-five preservice science teachers who were seniors at a state university in Turkey participated in this study. More preservice and inservice teachers should attend the teaching program, so effects of the program can be more deeply analyzed. Second, there are many different professional development programs to develop the preservice and in-service teachers' self-efficacy about alternative assessment (Raymond, 1996; Briscoe & Wells, 2002; Graham, 2005). Various practices (e.g., positive feedback, peer and self-assessment) were used in this study to enhance and evaluate preservice teachers' self-efficacy about the use of alternative assessment. In future research, it can be enhanced by different forms of practices and evaluate their effectiveness on self-efficacy.

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