

Fractions Teaching for 6th Graders through Creative Drama Method

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Abstract. The purpose of this study is to determine the impact of using creative drama method to teach fractions for secondary school-6th-grade students on the attitude and process. The study group consists of 16 (8 females, 8 males) 6th grade-students. In the scope of the study, One Group Pretest-Posttest Model was used as a pretest model. In the study, "Attitudes Towards Mathematics Scale" (Aşkar, 1986) and "Leader Evaluation Form" which that was developed by the researchers was used as data collection tools. Workshops towards teaching fractions by using creative drama method were carried out in the eight-week period and 23 lecture-hour (6 workshops). According to the findings, it can be said that the creative drama implementations have had a positive impact on the attitude scores of the students. The results of "Leader Evaluation Form" was determined that the participants took an active role in the process. The participants contributed more efficiently in the process each week. In the improvisation stage, the encounter of participants with examples from the daily life drew the attention. In this way, it was seen that their creativity came forward during their participation in the process and it was observed that participation in the actives that have a mathematics-based content was increased. In the evaluations of the process, participants had correct answers to the activity papers from the mathematical perspective.

Keywords: Mathematics education, fraction teaching, creative drama.

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1. INTRODUCTION

Since the beginning of the 1980s, the changes have emerged in mathematics education, and in many countries various research studies were conducted on the issue of how mathematics instruction should be and in line with these studies, the necessity of the methods that include different learning activities rather than the direct instruction were emphasized (Kyriacou, 1992; Sandra, 1995; Rosenthal, 1995; Turner, & Patrick, 2004). Direct instruction, expository instruction and teacher-centered instruction are among the commonly used instructional methods in mathematics education. In such kind of methods, students generally incline to memorize the information due to the fact that students are not given a chance to restructure the information and the passivating structure of the typical mathematics courses reduces the interest of many students, including the ones who have a potential of success, and gives rise to failure. For this reason, the studies conducted in the recent years, in developed countries and our country, on mathematics education, aim to activate students and improve their scientific thinking and problem-solving skills (Savaş, Obay, & Duru, 2006). This situation demonstrates the necessity of the student-based method, technique and strategy use. Reconstruction of the knowledge and emergence of permanent knowledge are inevitable in the process of student-centered education and instruction. According to Maslow (1943), even though the most basic need of an individual is; physiological, safety, belongingness and love, success and esteem need; the top level includes ethics, aesthetics, knowledge and creativity (Demir, 2016). For the meeting this aforementioned needs, creative environments are required. In a creative environment, individuals can express themselves in a better way. Therefore, rich education-instruction environments where students can express themselves conveniently are needed. The situations in which students are in the center of learning and participating at the learning process personally are actualized through active instruction methods. One of the methods -among the active learning methods- which puts the student at the center of learning, gives the responsibility of self-learning and provides group-work skills is the "Creative Drama" method. Creative drama is a method which can be used in several different fields (Fulford et al., 2001). It has been drawing attention in the recent years with its increase in using as a teaching method in education programs (Üstündağ, 2009). Creative drama has an important place in the programs due to the fact that the traditional education understanding is insufficient and as it takes the individual at the center of learning.

Creative drama can be considered as a method that facilitates experience-based learning by enabling the learner to establish collaborations both through in-group and non-group interactions actively, by discovering and questioning (Adıgüzel, 2010). The creative drama activities that are performed in a student-centered manner, enables students to structure and give a meaning to the knowledge (Jackson, 1997). In order to structure the knowledge, it should be added to the instruction process by designing appropriate instruction environments. Organizing the instructional activities in a student-centered

way rather than teacher-centered way through the activity-based and creative drama methods has a significance.

The new approaches employed in education require forming classroom environments which are more learner-oriented. It is possible to make mathematics instruction more pleasant by organizing the learning environment in a way to attract the attention of students more and through the activities that students participate in actively. It is thought that creative drama is a method that provides this required learning environment. Improvisations that students will realize with their idiosyncratic ideas and thoughts will enable them to acquire new and permanent learnings in mathematics teaching. Improvising what is play-like that is performed by students by revealing their creativity activate the individual. In order to put the individual at the center of learning, it is required to include the modern instruction methods into the process (Ersoy, 2014). Creative drama course also has an effective function in terms of reaching the aim in the education-instruction process. Learning by creative drama is an effective way that includes implementation based on a real-life situation. Because in the creative drama method, the student learning by doing and living at the center of the learning.

One of the courses where the student-centered learning approach is required is mathematics. In mathematics classes where many students find it difficult to understand, students should make sense of the information they have experienced by practicing with the knowledge they bring from their own environment and daily life. Most subjects of mathematics can be made to support meaningful learning by using instructional activities enriched with examples from students' experiences. In mathematics, one of the most appropriate subjects which can be diversified with daily life is fractions. In the teaching of fractional subjects, it is tried to provide meaningful learning by giving examples which are frequently encountered or likely to be encountered by the students in their daily lives. Although examples of fraction can be varied in a wide range of subjects in terms of daily life, fractional subject is still one of the most difficult subjects found difficult to understand by students.

One of the subjects that students face difficulties to learn is fractions. When the subject of fractions is started to be delivered after the instruction of the natural numbers in primary school-grades, students have difficulties in understanding the subject; and this situation creates a negative impact on student's mathematical success and attitudes towards the course (Soylu & Soylu, 2005). Due to the flaws in the instruction of fractions, students cannot pass to other topics. For this reason, teaching and learning of the knowledge on fractions are significant in terms of primary school mathematics education (MEB, 2005). The studies conducted on the issue demonstrates that not learning the subject of fractions well also leads to a negative impact on learning other mathematics subjects (Doğan, & Yeniterzi, 2011). Because, the subject of fractions underlies various subjects such as decimal numbers, rational numbers and ratio/proportion (İpek, Işık, & Albayrak, 2005). One of the first abstract concepts that students learn in the scope of mathematics is the concept of fractions (Pesen, 2007). The

studies conducted on the issue (Hasemann, 1981; Behr, Wachsmuth, Post, 1985; Hart, 1993; Kamii, & Clark, 1995; Aksu, 1997; Newstead, & Murray, 1998; Booker, 1998; Davis, 2003) demonstrate that students have difficulties in understanding the concept of fractions at every grade level and the problems emerge when fractions and fraction operations appear when they are not associated with concrete examples (Hasemann, 1981; Carraher, & Schliemann, 1991; Keijzer, & Terwel, 2003). The main reasons of these difficulties consist of the structure of fractions, the way of teaching (Aksu, 1997; Booker, 1998) and the abstractness of procedural parts (İpek, Işık & Albayrak, 2005). Students need to confront different problem situations in order to understand and comprehend the subject of fractions. According to Kar and Işık (2014), the terms and algorithms regarding fractions should be associated with daily life situations.

As mentioned in the studies conducted, the use of instructional activities involving daily life situations in the teaching of fractions plays an important role in overcoming the difficulties related to fractions. From this point of view, the application of creative drama prepared with examples taken from daily life problems is believed to be effective in removing the difficulties in teaching fractions. The aim of the study is to reveal the benefits of creative drama teaching method in fraction teaching.

1.1 Aim of the Study

The aim of the study is to determine the impact of using creative drama method to teach fractions for secondary school-6th-grade students on the attitude and process. For this reason, answers were sought to two problem situations in the following.

1.2 Problem

- 1-) How are the attitudes of secondary school-6th-grade students on mathematics in terms of teaching fractions through the creative drama method?
- 2-) How are the effectiveness of secondary school-6th-grade students in the process of teaching fractions through the creative drama method?

2. METHOD

The research model is based on organizing the required conditions for data collection and analysis, along with the research purpose and in an economic manner (Selltiz, Jahoda, Deutsch, & Cook, 1959; Karasar, 2002, s. 76). It can be said that the research model is a plan developed by the researchers purposely, in order to answer research questions or testing hypotheses (Büyüköztürk, 2007). The study is a quantitative study. In the study, One Group Pretest-Posttest Model was used as a pretest model. In the research process, pre-test and post-test results of the creative drama applications applied on a group of n units were compared. Since the data were obtained from two different data collection tools, the process of evaluating the data required analysis of two data sets and the relationship between them. In order to test the hypothesis suggesting "if two data sets of two different applications are obtained from the "n" unit group, this

data set is dependent and a random sample of a society whose average of differences equals zero", two sample dependent t-test are applied. However, the differences are required to show normal distribution. If the differences do not reveal normal distribution, the data are tested by non-parametric Wilcoxon T test. In order to evaluate the pretest-posttest results, two sample dependent t-tests are applied (Özdamar, 2004, s. 332). Because of the researchers have tried to determine benefits of creative drama method. In the research process, pre-test and post-test results of the creative drama applications applied on a group of units were compared.

2.1 Study Group

The study group consists of 16 -6th grade- students who receive education in a secondary school located in Samsun province. The age average of the 8 female and 8 male students, who participated in the study voluntarily, is between 11 and 12.

In the fifth grade, the concepts of unit fractions, integers, fractions, composite fractions, addition and subtraction are given in equal fractions. In other words, the basic concepts are taught in the fifth grade. In the sixth grade, there is a transition to fractions. The operations in fractions include comparison, sorting, counting, addition, subtraction, multiplication and division in the sub-learning area. As the reason for the selection of the study group, it is important that the processes in fractions are in the sixth grade and that the students get significant learning.

2.2 Data Collection and Process

The implementation of the research was carried out in an eight-week period. In the scope of the study 6 workshops were carried out.

In the applied drama plans, workshops of the sixth-grade fractions learning area were conducted. The applied plans were given below:

Plan 1- They recognize fractions.

A variety of games called Tell-Me-Its-Name, Tell-Me-Its-Shape, Identify-It and Mysterious Fraction have been played. The animation phase was introduced by giving various problem situations for the acquisition in the animation stage.

Plan 2- They sort and compare the fractions Sorts the fractions, compares and shows them in numerical axis.

During the warm-up and preparation stage, the games called Crazy Circle Game, the Numerator and Denominator Game, Fraction Game and Fraction Dance were played. At the end of the warm-up phase, it is aimed to remind the students the concepts of numerator and denominator and to make the value of the fraction setting out from the set of fractions.

Plan 3- They make addition and subtraction operations in equal fractions.

During the warm-up and preparation stages, a set of games such as Recognize Your Fraction, Show Your Fraction and Fraction Carrier were played. The improvisation technique was used in the animation stage.

Plan 4- They perform the addition and subtraction with unequal denominators.

During the warm-up and preparation stages, the students were prepared for the process by the games of Fraction Dance, Fraction Carpet, Fraction Line. In the event of a problem in the animation phase, the process of adding and subtracting the denominators in unequal fractions has been completed.

Plan 5- They perform multiplication of two simple fractions.

The warming-up and preparation stage have been completed by the games such as The Numerator and Denominator 1-2-3, Find the Fractional Path and The Fraction Carrier. The process was carried out by giving a problem situation involving the dramatic moment for the multiplication of two simple fractions in the animation phase.

Plan 6- They make a multiplication with a natural number and make sense of it.

During the warm-up and preparation phase, the course was introduced with a set of games such as Meet Me, My Colored Circles and Hopscotch. The improvisations were carried out by giving a natural number and a number of problem situations for the multiplication.

Plan 1 has been prepared for the fifth-grade acquisitions, i.e. pre-learning, in order to ensure that the students participate in the process and provide inter-group interaction. Other plans were prepared for the sixth-grade acquisitions. At the end of all plans, alternative measurement and evaluation tools were used. The total implementation duration was decided as 23 hours. As a result of each workshop, Leader Evaluation Forms were filled weekly. As a result of the process, "Attitudes towards Mathematics Scale" was applied again, and the change that the process has created on the participants was examined. The topic titles which were addressed in the scope of the workshop implementations were as follows:

- Orders the fractions, compares and indicates on the number line
- Makes addition and subtraction operations on fractions with the same denominators
- Makes addition and subtraction operations on fractions without the same denominators
- Makes the multiplication operation of two proper fractions
- Makes the multiplication operation with a natural number and a fraction, and gives a meaning to it.

The plans written in the creative drama applications of the above-mentioned acquisitions consist of the stages of warming-up and preparation, animation and evaluation. In the warm-up and preparation stages, games related to acquisition were

played to enable the students to get used to the process. In the animation stage, the situations involving past experiences and dramatic moments were presented. The students performed animations using creative drama techniques. In addition, different problem situations were presented in the animation stages. In the evaluation stage, alternative assessment-evaluation tools were used to determine whether the students had achieved the acquisitions. It was determined how the students achieved their learning goals particularly by asking open-ended questions. The aforementioned data collection tools were presented below respectively.

2.2.1 Attitudes Towards Mathematics Scale

With the purpose of determining students' attitude towards mathematics, "Attitudes towards Mathematics Scale", which was developed by Aşkar (1986), was used. The scale consists of 20 Likert style-items as; "absolutely appropriate", "appropriate", "neutral", "inappropriate" and "absolutely inappropriate". These consist of items expressed in a positive manner such as "mathematics is a course which I like" (4,6,7,13,14,16,17,18,19,20) and items expressed in a negative manner such as "I do not like mathematics" (1,2,3,5,8,9,10,11,12,15). The answers given for the positive sentences scored as 4,3,2,1,0 starting from the "absolutely appropriate" option and the negative sentences were scored as 0,1,2,3,4 by starting from the same option as well. The Cronbach alpha reliability coefficient of the 20 items was calculated as 0,96.

In terms of the development of the scale, both unrotated and varimax rotated principal component analyses were employed with the purpose of finding out the factor structure of the scale. In the case that the factor load of an item is over 0.45 and higher approximately 0.20 or over than the load of the item in other factors, the item was regarded in that factor (Phifer, & Plake, 1983; cited Aşkar, 1986). The items in the scale have affective and psychomotor characteristics and loads of the items in the sole factor differ between 0.63 and 0.86. The alpha internal consistency reliability coefficient of the 20 items was calculated as 0, 96. In addition, the fact that the items of the scale accumulated in a sole factor demonstrated that the measured variable is unidimensional (Aşkar, 1986).

2.2.2 Leader Evaluation Form

In the phase of developing "Leader Evaluation Form", first of all, the literature was searched. Data collection tools towards the evaluation of contributions made to the process by observing the participants were researched. As it was thought that, the leader who can manage the workshop in drama implementation will make the best observation, it was planned that developing a Leader Evaluation Form would be appropriate. "Leader Evaluation Form" was developed by the researchers. The form was evaluated by three domain experts for the content validity. The form took its last shape by making the necessary corrections after the suggestions and feedback provided by the experts. Leader Evaluation Form was filled regularly by the researcher and observer after the weekly implementations.

A leader is the person who is expert in the field of creative drama and carries out the application. The observer is a graduate student in mathematics education.

The leader and observer wrote down their evaluations towards each group, which consist of 5-6 persons, on Leader Evaluation Form. As a result of the process, the researcher and two experts reached a consensus on differences and similarities through the evaluations regarding Leader Evaluation Forms. The Leader Evaluation Form evaluation criteria were prepared in accordance with the 5 point-Likert type as (1) poor, (2) fair, (3) good, (4) very good and (5) excellent. The form that was developed consists of four stages as warm-up, improvisation, evaluation and general evaluation.

In the warm-up stage, the participants were evaluated in five phases by the leader and observer by considering their orientation to the dramatic playing activities, communication skills, following the instructions, communication skills, providing group dynamic and their approaches to the process. In the improvisation stage, three phases were identified as participants' contribution to the improvisation process, their self-tendency to the behavior, and willingness to improving their creativity. The improvisation stage was filled by the leader and observer weekly after each observation. In the evaluation stage, five phases were created by considering participants' feelings and feelings, their ability to make an association between the study and achievement, reaching the achievement and their written and vocal evaluations. Each stage was evaluated at the end of the workshops. On the other hand, the general evaluation stage covers the whole process. Participants' contributions to the warm-up, Improvisation, and evaluation stages were evaluation at this stage. In addition, participants' orientation to the process, group dynamic and their self-expression abilities were also included.

2.3 Data Analysis

In the data analysis, firstly, the number of participants in the study group was examined according to the analyzes. But the data have not indicated a normal distribution. After determining that the data were not normal, nonparametric measurements were made for attitude scale. Thus, for the data analysis, Wilcoxon T test was employed as a paired test which is the non-parametric data alternative of the t-test (Özdamar, 2004). And the data obtained from the leader evaluation form were evaluated according to the stages of the creative drama. The results were taken into consideration the frequencies of the obtained data.

In order to determine the effectiveness of secondary school-6th-grade students on creative drama instruction method, Leader Evaluation Form was developed. By observing the effectiveness of participants in the process, group-based evaluations were made at the end of each implementations. The forms were filled by considering the evaluations made by the leader weekly and the groups at the end of the implementation process. In the scoring phase, the observer also made evaluations with the leader. A consensus was reached in terms of the evaluation of the groups.

3. FINDINGS

3.1 Findings towards the first sub-problem

Before the analysis of the data, whether the attitude score of the students who participated in creative drama implementations show a normal distribution or not was considered. In order to determine whether the data have a normal distribution or not, Shapiro-Wilk test statistic was employed (Table 1).

Table 1.

Normality Distributions (Shapiro-Wilk's Values)

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	sd	p	Statistic	sd	p
Attitude Scores	,106	32	,200	,933	32	,048*

*p<0.05.

As the p value is below 0,05, it was appeared that the data did not distributed normally (0,048<0.05). As the data has not indicated a normal distribution it is required to refer to non-parametric tests. In the study, Wilcoxon T test was employed as a paired test. Wilcoxon T test is used with the purpose of testing the significance of the difference between the scores of two relevant difference assessment sets (Büyüköztürk, 2007). In addition, Wilcoxon T test paired test, is the non-parametric alternative of the t-test (Özdamar, 2004). The findings on the two example sets were presented below (Table 2).

Table 2.

Wilcoxon T test Findings of the Attitude Scale

Scores	Rankings	n	sd	z	p
Attitude score pretest	Negative rankings	3	6,83	20,50	
Attitude score posttest	Positive rankings	13	8,88	115,50	
	Equal			2,46	0,014*

*p<0,05.

As t is seen in the table presented above, as a result of the Non-Parametric Wilcoxon Test, which was performed to determine whether there is a significant difference between the paired pretest-posttest scores, the difference between the ranking averages was found statistically significant (0,014<0,05). When the rank sum of the difference scores is considered, it is seen that the observed difference is in favor of positive rankings, in other words in favor of the posttest score. According to this result, it can be said that creative drama implementations applied in mathematics course affects

students' attitude scores positively. It can be commented that the activities appeal to students as they attract their attention and increase their interest towards the course depending upon the positive change in their attitudes towards fraction topics and mathematics.

3.2 Findings towards the second sub-problem

The findings on the sub-problem of "How are the effectiveness of secondary school-6th-grade students in the process of teaching fractions through the creative drama method?" were presented below.

3.2.1 Leader evaluation forms of the first week

The leader and observer evaluated each group in four categories as; warm-up, improvisation, evaluation and general evaluation, before leaving the class at the end of the first implementation. The frequency and percentage values of regarding evaluations on each group were given below.

Table 3.

Evaluations on the First Week

	1. group		2. group		3. group		4. group		5. group	
	f	%	f	%	f	%	f	%	f	%
Warm-up	11	44	5	20	13	52	14	56	17	68
Improvisation	7	47	5	33	6	40	7	47	6	40
Evaluation	14	56	9	36	11	44	16	64	20	80
General Evaluation	12	40	13	43	16	53	16	53	20	67

A workshop was organized towards establishing in-group communication, provision of a group dynamic and being able to interact individually and in the group for the first week that students meet the creative drama process. It did not work out very easily for the student's adaptation to the process in the workshop organized in the first week. According to the frequency values in Table 3, it was observed that the second group members were considerably worried during the warm-up stage. When we look at the percentage and frequency values of the groups according to Table 3, it could be noted that the second group students have received low scores in the warm-up and preparation stages.

Because students confront such kind of a teaching and learning environment for the first time. The students completed the warm-up stage by playing the drama activities of; Tell Your Name, Tell Your Shape, Tan Game and Mysterious Fractions. In the first week-improvisation stage, students were asked to perform improvisations related to the process by reading the story text called "The Story of Tan". It was observed that the participants got excited in the improvising stage, they were trilled, were not able to use their voices and the stage properly, did not understand the instructions well and did not what to do. The percentage values in Table 3 revealed that the improvising stage was

compelling. In the first-week evaluation phase, it was determined that students were slowly expressing their feelings.

It has been noted that the students have difficulty in expressing their feelings according to the findings obtained from the leader evaluation form in the first week.

The participants stated in the evaluation stage that their curiosity was gradually increasing towards the process. When the first week-general evaluations were considered, it was seen that despite the first week, contributing in improvisation and evaluation stages, adapting to the process, providing group dynamics and their self-expression skills were at a medium-level.

3.2.2 Leader evaluation forms of the second week

The leader and observer evaluated each group in four categories as; warm-up, improvisation, evaluation and general evaluation, at the end of the second workshop implementation. The frequency and percentage values of regarding evaluations on each group were presented below.

Table 4.

Evaluations on the Second Week

	1. group		2. group		3. group		4. group		5. group	
	f	%	f	%	f	%	f	%	f	%
Warm-up	14	56	13	52	12	48	19	76	15	60
Improvisation	8	53	11	73	6	40	9	60	11	73
Evaluation	18	72	16	64	17	68	19	76	20	80
General Evaluation	22	73	15	50	16	53	22	73	24	80

In the second week, the dramatic activities called; Crazy Circle Game, Numerator-Denominator Game, Fractions Game and Fraction Dance were played in the warm-up stage of the workshop organized towards the achievement of "Orders the fractions and compare". It was determined that students were able to associate the activities with mathematics and do not have serious problems with recognizing numerator-denominator concepts. In the warm-up process, it was seen that students find out the information on the value of a fraction. On the other hand, in the improvisation process, the groups were exposed to a dramatic situation which they were expected to have with their mother. It was seen that students play a more active role in the improvisation related to the daily life, in comparison to the first week. In the evaluation stage, it was observed that students were able to answer the questions and order the fraction sets given to each group and the unit fractions. The findings obtained from this stage revealed that students' learning on ordering and comparing the fractions was positive.

3.2.3 Leader evaluation forms of the third week

In the third week, the observations made by the leader and observer were collected through Leader Evaluation Form in order to determine the effectiveness. The obtained data were presented in Table 5.

Tablo 5.

Evaluations on the Third Week

	1. group		2. group		3. group		4. group		5. group	
	f	%	f	%	f	%	f	%	f	%
Warm-up	18	72	5	20	20	80	8	32	19	76
Improvisation	11	73	6	40	9	60	11	73	15	100
Evaluation	18	72	15	60	20	80	24	96	20	80
General Evaluation	23	77	14	47	22	73	25	83	24	80

In the third week, the dramatic activities called; Know Your Fraction, Show Your Fraction, Fraction Carrier were included in the warm-up stage towards the achievement “Makes addition and subtraction operations on fractions with the same denominators”. The plays in the warm-up stage were prepared towards the fractions with the same denominators. It was determined that most of the participants did not have any problems in terms of participating in the process. However, the decrease in the participation of the students in the second and fourth groups in the warm-up stage (Table 5) occurred from the in-group communication problem. In the improvisation stage, the process of going on a picnic with their teachers made students excited. From the percentage values (Table 5), it was seen that the engaging to the improvisations which were given for making kites was considerably good. In the evaluation stage, it was found out that they reached the achievement as they expressed the fractions values that were obtained from the game activities, Fraction Carrier, in the warm-up stage by using pattern blocs.

3.2.4 Leader evaluation forms of the fourth week

The leader and observer evaluation towards the achievement of “Makes addition and subtraction operations on fractions without the same denominators” was presented in Table 6.

Table 6.

Evaluations on the Fourth Week

	1. group		2. group		3. group		4. group		5. group	
	f	%	f	%	f	%	f	%	f	%
Warm-up	7	28	14	56	8	32	13	52	6	24
Improvisation	5	33	6	40	7	47	7	47	6	40
Evaluation	10	40	8	32	11	44	7	28	13	52
General Evaluation	13	43	8	27	12	40	12	40	8	27

In the fourth week, it was determined that the participants face difficulties relatively in the warm-up stage, during the activities called; Fraction Dance, Fraction Order and Fraction Carpet. Despite the fact that facing mathematics within the plays made students worried at first, they displayed a relatively active participation towards the process in the improvisation stage. Their role plays concerning the addition and subtraction operations on fractions without the same denominators were related with the daily life. In the evaluation stage, they were asked to add the denominators in their pockets at the end of the Fraction Carpet game and write it down on the activity paper. It was understood from the evaluation papers at the end of the process that the students enforced to gain the achievement. It was determined in the implementation about the achievement of “Makes addition and subtraction operations on fractions without the same denominators” that students generally face difficulties in terms of reaching a solution by modelling.

3.2.5 Leader evaluation forms of the fifth week

The leader and observer evaluation towards the achievement of “Makes the multiplication operation of two proper fractions” was presented in Table 7.

Tablo 7.

Evaluations on the Fifth Week

	1. group		2. group		3. group		4. group		5. group	
	f	%	f	%	f	%	f	%	f	%
Warm-up	19	76	20	80	21	84	22	88	15	60
Improvisation	13	87	12	80	11	73	14	93	11	73
Evaluation	18	72	22	88	18	72	23	92	21	84
General Evaluation	25	83	21	70	26	87	23	77	26	87

In the fifth week, the activities called; Numerator-Denominator 1-2-3, Fraction, Find Your Way and Fraction Carpet was included. The plays drew the attention of the participants and their engaging to the process was carried out considerably well. It was seen that their participation was quite successful in the improvisations performed for the day that a lesson examination period. Participants’ role plays about a situation from their daily life had become more creative towards the end of the implementation. Their improvisations of multiplying two proper fractions by using transparent fraction cards drew the attention of the researchers. In the evaluation stage, participants multiplied two proper fractions that they obtained from the plays, by using transparent cards Numerator-Denominator 1-2-3 and Fraction Carpet. Generalization made by the participants demonstrated that they filled the evaluation forms towards the process faultlessly.

3.2.6 Leader evaluation forms of the sixth week

The leader evaluation form on determining the effectiveness of the participants in terms of the process was presented in Table 8.

Table 8.

Evaluations on the Fifth Week

	1. group		2. group		3. group		4. group		5. group	
	f	%	f	%	f	%	f	%	f	%
Warm-up	24	96	24	96	23	92	24	96	24	96
Improvisation	15	100	14	93	15	100	15	100	14	93
Evaluation	20	80	20	80	20	80	20	80	20	80
General Evaluation	25	83	30	100	26	87	25	83	30	100

In the sixth-week warm-up stage the playing activities called, Meet With Me, My Colorful Circles and Hopscotch was played concerning the achievement of “Makes the multiplication operation with a natural number and a fraction, and gives a meaning to it”. It has been understood from the frequency and percentage values that the engaging of the participants to the activities in the last week is quite good. Participants reached the achievement by improvising for the fabric amount by starting from octagon models. In the last week implementation, it was determined that they solve the problems as a group and discuss the issues. The participants wrote down the process steps on the activity paper by multiplying the values that they created with their partners in the second warm-up activity. In addition, it was identified that they carried out the multiplying operations, which are included in the table of the scores that they obtained from the Hopscotch game, accurately. It was determined that the participants displayed a high performance in the last-week.

4. RESULTS, DISCUSSIONS AND SUGGESTIONS

This section includes the results of the study, discussions and suggestions.

4.1 Results and Discussions

In the first sub problem on the six-week creative drama implementations towards teaching fractions, participants attitude towards mathematics course were evaluated. The results obtained highlighted the fact that creative drama implementations applied in mathematics course affect students' attitude scores positively. While the studies, which were conducted on the question of how mathematics teaching should be, indicate the necessity of methods that include various and different activities rather than direct instruction (Kyriacou, 1992; Sandra, 1995; Rosenthal, 1995; Turner, & Patrick, 2004); they also demonstrate that students' attitudes towards the course change positively in

different teaching and learning environments. The conducted study figured out that the creative drama method affects students' attitudes towards mathematics positively.

Concreting in mathematics instruction and the using of concrete materials facilitate the process of reasoning and problem-solving for students (Burns, 1996). The materials used in the process of creative drama instruction method (fraction sets, fraction carpet, transparent fraction cards, tangram, colorful circles, colorful cardboards, colorful cushions, patterns blocs) revealed that students seek for answers by reasoning and they adopted positive attitudes in this process.

When the leader evaluation form was examined as a result of the six-week implementation, it was determined that participants took an active role in the process. The participants had participated in the process more actively each week. The difficulties that the participant confront during the warm-up phase occurred from the fact that they never play or participate this kind of activities. In the improvisation stage, the encounter of participants with examples from the daily life drew their attention. Therefore, it was seen that their creativity came forward in terms of their participation in the process. The participants who contributed to the evaluations on the process gave correct answers to the active papers and made appropriate evaluations regarding the achievement.

As the creative drama in education is a method which is based on experience-based learning by establishing an active collaboration by the learner through in-group and non- group interactions, by discovering and questioning (Adıgüzel, 2010); it is required to make an evaluation by observing the interaction of the participants. In the study, determinations were made by observing the effectiveness of the participants to the process week by week through the Leader Evaluation Form.

In the creative drama practices, participants display a problem-solving behavior constantly (Altuntaş, & Altınova, 2015). The instruction of fractions based on the rules in general (Rule, & Hallagan, 2006; Uteley, & Redmond, 2008) and students are expected to comply with the rules. In the creative drama method, learning of students by different activities is the matter rather than learning by rules. In the warm-up stage, the situation that students make associations with mathematics while they are playing the roles demonstrates that they go beyond the rules. In the improvisation stage, the participation of students in the process through daily life examples help them to make a correlation with mathematics in a activity-based way. In the evaluation process, the variety of the plays, activities and evaluation questions that aim at the learning purpose are indicators of to what extent the learning achievement was reached. At the end of the creative drama instruction method, learning the subject of fractions by doing-experiencing, rather than memorizing it with the rules, is the base.

The fact that students play like these activities for the first time can be expressed as a reason to face difficulties in terms of providing the group dynamic.

4.2 Suggestions

In current days education process, traditional instruction environments exist. Students need environments where they can feel comfortable and be in the center of the learning. It is suggested to increase the creative drama instruction method practices by organizing teaching and learning environments. In addition, various assessment and evaluation materials should be employed in order to assess the effectiveness of the creative drama instruction process.

It can be stated that the creative drama instruction method affects students' attitudes positively. However, it can be recommended to assess other affective achievements as well. The implementation plans oriented at the subject of fractions include a certain number of achievements. The plans can be prepared on the other achievements of the subject of fractions and implementations can be carried out. It can be suggested to conduct the study with students from different secondary schools to identify the differences. The studies found out to what extent the creative drama method is effective. It can be recommended to alter the current instruction programs and include creative drama plans into the process. In this context, the prospective teachers should be provided with the capacity to improve this important skill of their students in the education faculties of the universities that raise teachers. Because, it is thought that preparation of the education programs which include creative drama is fundamental in terms of preparing prospective teachers for the future by providing them with a different perspective (Altuntaş, & Altınova, 2015). In this sense, it can be recommended to prepare and introduce appropriate education programs by the domain experts.

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