



USE OF CREATIVE DRAMA IN SCIENCE AND MATHEMATICS BY PRESERVICE ELEMENTARY TEACHERS

FEN VE MATEMATİK DERSLERİNDE SINIF ÖĞRETMENLİĞİ ÖĞRETMEN ADAYLARI TARAFINDAN YARATICI DRAMANIN KULLANIMI

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Abstract: The purpose of this study is to analyse science and mathematics lesson plans prepared in the light of drama based instruction by preservice elementary teachers. For this purpose, 12 female participants were chosen voluntarily. They gained basic knowledge and experience about creative drama by involving sample creative drama activities and lesson plans in science and mathematics. After that preservice elementary teachers prepared their own lesson plans on science and mathematics topics. These lesson plans were analysed based on the criteria for creative drama lesson plan preparation. Furthermore, the participants were interviewed in order to understand how they perceived the use of creative drama in science and mathematics classrooms. The results revealed that in spite of some lacking points, the prepared lesson plans were compatible to the stages and components of creative drama.

Keywords: science and mathematics education, creative drama, preservice elementary teacher

Özet: Bu çalışmanın amacı sınıf öğretmeni adayları tarafından yaratıcı drama yöntemi kullanılarak hazırlanan ders planlarını analiz etmektir. Bu amaca yönelik olarak, 12 gönüllü kız öğrenci seçilmiştir. Fen ve matematik alanlarına yönelik hazırlanmış olan örnek yaratıcı drama etkinlikleri ve ders planları bu öğretmen adayları ile uygulandıktan sonra, katılımcılar fen ve matematik alanında seçtikleri konulara yönelik yaratıcı drama temelli ders planları hazırlamışlardır. Hazırlanan bu planlar, yaratıcı drama temelli ders planı değerlendirme ölçütleri göz önüne alınarak değerlendirilmiştir. Ayrıca, yaratıcı dramanın bir yöntem olarak fen ve matematik eğitiminde kullanımına yönelik, öğretmen adaylarının görüşlerini almak için, onlarla görüşmeler yapılmıştır. Araştırma sonuçlarına göre; hazırlanan ders planlarında her ne kadar bazı eksiklikler olsa da, sınıf öğretmeni adaylarının yaratıcı dramanın aşamalarına ve bileşenlerine uygun ders planları hazırlayabildikleri söylenebilir.

Anahtar Sözcükler: fen ve matematik eğitimi, yaratıcı drama, sınıf öğretmeni adayları

1. INTRODUCTION

In the educational community, new teaching and learning strategies producing better, smarter and creative learners have started to be applied in schools. Teachers are the critical component to structuring an individualized science and mathematics curriculum for learners. Therefore, it is important for inservice and preservice teachers to be aware of new trends in science and mathematics lessons. Guidelines for beginning teachers emphasize that teachers should be able to provide classroom instruction that appeals to multiple learning styles, motivates and engages students and gives opportunities for collaboration and problem solving (NCATE, 2001). Preparing future teachers to use creative drama based instruction serves to meet this requirement. Concurrent with the development of Dewey's theory on "learning by doing" was the formulation of the idea that creative drama is an effective method of learning (Courtney, 1968). It can be defined as experiencing or living an idea, a unit, an event of a daily life, a concept, or a behavior by considering the previous cognitive patterns (San, 1998). In creative drama activities, a leader guides the participants to create, imagine, and reflect their experiences and the aim is to involve the whole child in the learning process (Tabak, 2002). This means that the personality, the psychological and cognitive process of the child, and all the other factors belonging to the child should be included in the learning process. Many research emphasized the utilization of creative drama in classrooms as a teaching method. Some of the research results are summarized as follows; creative drama develops students' self-esteem, self-concept, trust, and acceptance of a person by the group; enhances story understanding of elementary school children;

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there are long-term learning outcomes if the dramatic techniques are used appropriately; education is concerned with individuals, drama is concerned with the individuality of individuals, within the uniqueness of each human essence; it also increases creativity, sensitivity, fluency, flexibility, emotional stability, cooperation, and examination of moral attitudes, while developing communication skills; divergent and cognitive thinking skills, communication skills can be fostered by the help of creative drama process; it has the potential to develop children's language, cognition, problem solving ability, achievement in various disciplines and attitude towards to the courses; creative drama provides an opportunity for students in activities that require children to conduct improvization, to analyze the roles in the improvization, and to work cooperatively in creative tasks; creative drama activities are student-centered activities where experiential learning can be developed (Annarella, 1999; Baker, 1996; Cavarretta, 1990; Duatepe, 2004; Duatepe & Ubuz, 2004; Elisa, 1993; Freeman, Sullivan, & Fulton, 2003; Giffin, 1990; Hoetker, 1969; Linn, 1999; Stewig, 1972; Üstündağ, 1997; Wagner, 1988; Way, 1973; Williams & McCollenster, 1990).

According to Wells-Kaaland (1993), creative drama which is an effective instructional method, should be given as a course for preservice elementary teachers. Introducing this new topic to the preservice teachers is important to make them familiar with new trends and instructional methods in teaching science and mathematics. It is a well-known fact that, real life based contexts and living a science or mathematical idea can make students interested in the topic and better achievers (Ainsworth, Bibby, & Wood, 2002; Smith, 2004). It's the teachers' responsibility to provide their students such facilitating learning opportunities. Hence, the preservice teachers should be prepared for implementing teaching methods that make science and mathematics more alive and meaningful. Creative drama can be used as a teaching method at this point by serving this purpose. Besides, planning lessons for a new and increasingly popular teaching method is a critical aspect of teacher work since in preservice teachers' education new teaching approaches is beneficial when they become in-service teachers. However, there are few studies on the usage of creative drama particularly, in science and mathematics education. Therefore this need made researchers to conduct a research study including preservice teachers on this topic.

The purpose of this study was to introduce creative drama to preservice elementary teachers and to analyse prepared lesson plans based on the principles of creative drama for selected science and mathematics topics. Furthermore, this study sought to investigate preservice elementary teachers' perceptions related to use of creative drama in science and mathematics lessons.

2. METHOD

The participants were 12 volunteer female junior preservice elementary teachers. For the purpose of the study, the researchers, specialized in creative drama, conducted introductory drama based instruction with the participants. In order for preservice elementary teachers to learn general knowledge on what creative drama is, techniques in creative drama and its applications in science and mathematics education, they were instructed for six hours. Two lesson plans one on science and one on mathematics based on creative drama method developed by the researchers were implemented on the participants. The science lesson plan was prepared on the topic of "animals" and the mathematics lesson plan was on "sets". Briefly, according to the lesson plans, the lecture began with a warm-up activity, continued with improvisations and at the end of the session, the participants were engaged in a conversation for gaining a feedback and emphasizing what they have learned. All these activities were relevant to each other and to the aims of the lesson. After gathering some creative drama experience, preservice elementary teachers were asked to prepare their own lesson plans on any topic of science and mathematics based on what they learned during the introduction lesson for creative drama and what they experienced during the application of science and mathematics lesson plans. Afterwards, they were interviewed about the use of creative drama in science and mathematics classrooms. The analysis for this study was based on lesson plans prepared by the 12 participants. In this study, while analyzing the science and mathematics creative drama lesson plans prepared by the preservice elementary teachers, the criteria for the analysis includes the stages of creative drama;

warm-up activities, improvisations, and evaluation (Adıgüzel, 2002); and some basic components of creative drama, such as; drama techniques, dramatic moments, make believe plays, teacher and student roles (Adıgüzel, 2002; Akar, 2000; Güneysu, 2002; San 2002; Üstündağ, 2002). The stages and the components of creative drama were explained in detail in the results part. Besides, whether the preservice teachers followed the general steps for an effective lesson plan preparation while preparing their lesson plans were also considered. For this purpose, the traditional planning model first proposed by Tyler (1950) was used as the criteria to evaluate the lesson plans prepared by the preservice elementary teachers. This model consists of four steps; specify objectives, select learning activities, organize learning activities and identify evaluation procedures. These criteria have been recommended for use at all levels of curriculum planning (Clark & Peterson, 1986).

3. RESULTS AND DISCUSSIONS

In Table 1, the number of science and mathematics lesson plans in terms of grade levels and units prepared by preservice elementary teachers can be seen.

Table 1. The number of prepared science and mathematics lesson plans in terms of grade levels and units

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
	For science lesson plans				
Living and Nonliving Organisms	-	-	-	5	1
Matter		-	-	2	-
Electric	-	-	1	3	-
	For mathematics lesson plans				
Numbers	-	-	1	-	1
Geometry	1	-	3	1	1
Measurement	-	2	1	-	-
Data analysis	-	-	1	-	-

From Table 1, it can be observed that different units were chosen for science and mathematics lesson plans. Since for both science and mathematics, majority of (6 out of 12) the lesson plans were prepared on the unit of living and nonliving organisms for science and geometry for mathematics, it was decided not to analyse all 24 lesson plans, but only those 12 lesson plans.

The following Table 2 and Table 3 gave the analysis of 6 lesson plans prepared related to the unit of living and nonliving organisms four of which are for Grade 4 and one is for Grade 5 and the other 6 lesson plans prepared related to the unit of geometry one for Grade 1, three for Grade 3, one for Grade 4 and one for Grade 5.

Table 2. The construct of lesson plans for the unit of Living and Nonliving Organisms.

	Grade 4	Grade 4	Grade 4	Grade 4	Grade 4	Grade 5
Subjects taught	Organisms	Characteristics of living organisms	Organisms in our environment	The effect of people on environment	Plants	Living habitats of organisms
Duration	60 minutes	80 minutes	40 minutes	60 minutes	60 minutes	60 minutes
Stages of Creative Drama						
Warm-up	1.Name activity 2.Walking while thinking 3.Relieving activity 4.A play	1.Name activity 2.Walking while thinking 3.Two plays	1.Two plays 2.Walking	1.Walking 2.Imagination	1.Name activity 2.Walking while thing 3.2 plays	1.Name activity 2.Two plays

Table 3. The construct of lesson plans for the unit of geometry.

	Grade 1	Grade 3	Grade 3	Grade 3	Grade 4	Grade 5
Subjects taught	Geometric Shapes	Perimeter	Angles	Triangle, Square, Rectangle and Circle	Square and Rectangle	Circle
Duration	80 minutes	80 minutes	80 minutes	40 minutes	80 minutes	80 minutes
Stages of Creative Drama						
Warm-up	Two plays	1. Three plays 2. Thinking while walking	Two plays	Three plays	Name activity	Three plays
Follow-up Evaluation	After each play, evaluation stage is considered to evoke the concepts related to the geometric shapes.	Not included	Not included	Not included	Not included	After each play, evaluation stage about what the students have done was put into the lesson plans.
Improvisation	Making an improvisation about the objects situated in a kitchen	Not included	Improvisation in pairs about the certain objects	About geometric figures in daily life	About a story including square and rectangle	About making improvisations about the shapes that look like a circle
Evaluation	1. Sharing feelings and thought related to the whole creative drama process with the whole group 2. Discussing the properties of geometric shapes that were mentioned in this class	Discussing the perimeter of a rectangle and square.	Sharing feelings and thought related to the whole creative drama process with the whole group	Sharing feelings and thought related to the whole creative drama process with the whole group	Writing letters to the themselves as if they were a geometric shape	Making an evaluation about the topic by a play
Components of Creative Drama						
Make believe play	As if the students were certain objects in the kitchen.	Not included	Not included	As if the students were triangles, squares, rectangles, or circles.	As if the students were some sort of geometric figures living in a same country	Not included
Dramatic moments	Not included	Not included	Not included	An obstacle to overcome in the context of having edges for each geometric figure	A tension between geometric groups in a meeting	Not included
Drama techniques	Private property, still image	Not included	Not included	Not included	Whole group drama	Not included

3.1. Related to the stages of creative drama

In all of the science and mathematics lesson plans, it can be stated that, the stages of creative drama were well implemented and properly followed throughout the lesson plans. The activities for aims of the lessons were well organized. The events and activities in warm-up stages were intelligently transferred to the improvisation which is a desired outcome of creative drama lesson planning; all of the activities must be in relation with each other in some way, forming horizontal and vertical relationships in terms of aims, activities and stages.

Warm-up activities are the basic activities by which getting familiar with the group members (Adigüzel, 1994), being ready for the rest of creative drama process and building a trust relationship among participants (Ergün, 2003) could be aimed by the drama leader. The warm-up activities should not be selected randomly but they must be related with the aims of the study and with the rest of the lesson. One of preservice teachers, planned to begin the science lesson by a name activity and two plays. Both of the plays include the connections to learn about the concepts of living habitats of organisms in a well organized manner. In another lesson plan for science in which the aim of the lesson was to give examples for living and nonliving organisms and to differentiate between them, the warm-up activities were also such a creative, comprehensive and rich that students were easily adapted to work together during the process. One of the students for example, used the fruit basket play which is mostly used for concept learning, and she adapted this game for the science topic. The concepts selected for this game were the name of some living and nonliving organisms like flower, insect, house and stone. In the first mathematics lesson plan prepared on the subject of geometric shapes, it can be claimed that, the two plays were highly motivating and integrating the geometric concepts truly. The lesson plans differ in the units for the third grade. Perimeter, angles, and the triangle, square, rectangle and circle were the selected units. All three lesson plans incorporated plays as warm-up activities. And one of the lesson plan involved “walking by thinking” related to the subject of the lesson in addition to the plays. However in two plays, the subjects did not establish the essential link between the geometric topic and the play itself. Therefore, the play was put into the lesson plan for its own sake. The lesson plan for grade four is one of the best lesson plans in this sample. As warm-up activities, the preservice teacher used different plays and “thinking while walking”. The plays were planned as the students could have fun and competition. Moreover, they can actively think about the properties of the square and rectangle. For instance, in one of the plays, it was planned for students to play the well-known play called as “Who am I?”. This play was adapted into this geometry topic by her by asking the features of square and rectangle. The last lesson plan for geometry was about the circle. The preservice teacher planned to begin this lesson by three plays, however these two plays were lacking in making connections between the concept of circle, therefore these plays were just for having fun not for learning mathematics.

In two science and mathematics lesson plans each warm-up activity was conceptualized by its follow-up evaluation. However, it would be useful to plan asking some questions in follow-up evaluation about the science and mathematics topics that were mentioned in the warm-up activities. Especially, in one of the mathematics lesson plans, the evaluation parts were related to the plays not to the concept of circle. The participant planned only to ask “what we have done today?”. She did not relate this question with geometry.

Improvisations constitute the most significant part of creative drama activities. The fundamental feature of improvisation is that it does not require a beforehand text for the participants (Urian, 2000), it is spontaneous. This stage must include relations with the aims of the study and be relevant with the warm-up and the other stages of creative drama. Various drama techniques can also be used during the improvisations stage and the dramatic moments must also be emphasized which will be explained in the following sections. For instance, one of the preservice teachers used photographs and texts about some of the organisms and their features for the improvisation stage in her lesson plan. After grouping the students, she distributed the organisms’ photographs with a written text to the groups and the groups carried out their improvisations one by one. The topics and examples that were used by preservice teachers in improvisations were also from the daily life which is also a necessity for

creative drama activities. However, in one of the science lesson plans, the improvisation stage was too short which is not appropriate with the nature of creative drama lesson plans and seemed to be irrelevant with the activities in the warm-ups and in evaluation. In the first lesson plan for the unit of geometry, the improvisation was well-planned, and two of the drama techniques were used in this improvisation; private property and still images. Private property was planned to be used as if the students were the objects in the kitchen and they were talking from those objects's views. Except one of the preservice teacher, the two preservice teachers planned improvisations for the lesson plans of third grade. One of them was a pair improvisation, and the other one was about the geometric figures used in daily life. In the lesson plan for the fourth grade, the improvisation of a story about square and rectangle took place. This was planned as a whole group drama since it involved the whole class. The last improvisation that imagined was inadequate to be labeled as an improvisation since it had no dramatic moment. It can be better called as forming circles by using students' bodies.

As Adıgüzel (1994) stated evaluation can be made in any moment during the process of creative drama. The evaluation in creative drama is about self assessment of the drama leader and participants within the group. All of the activities are expected to be discussed in this stage by making the connections with science and mathematics topics. Instead of this, the preservice teachers mostly planned to share feelings and thought related to the whole creative drama process with the whole group making no connections with the unit or with the other stages. It would be better if there was more connection between the aims of the lesson plan activities and the evaluation process. There was only one lesson plan prepared in science for the topic of the effects of people on environment, which had an evaluation stage. All of the activities starting with warm-ups and considering the knowledge that students acquired during the activities were discussed and therefore the necessary science learning throughout the lesson was achieved. As for the first mathematics lesson plan, it was planned to be discussed about the concepts of the geometric shapes and also allowed to share opinions and feelings of the subjects. Two of the lesson plans from third grade were ended with only a "sharing feelings and thoughts" evaluation. Among all, the evaluation part for the fourth grade lesson plan was attractive. The preservice teacher planned to make students believe that they were one of the geometric shapes and required to write a letter to themselves.

3.2. Related to the components of creative drama

In this section, the science and mathematics lesson plans were discussed based on some components related to creative drama including make believe play, drama techniques, dramatic moment, the teacher and students role and group work. In creative drama activities, students behave as if they were any kind of objects, matters, animals or shapes depending on the aim and topic of the lesson. Make believe plays that can be done by "doing as if something is occurred or behaving as if someone else" can be observed in any stages of creative drama (Duatepe, 2004). All of the science lesson plans involved make believe play. For example, in one play, everyone in the class was one of the living or nonliving organisms and imitated the organism by using his/her body language to the whole class who tried to estimate, then everyone wrote his/her organisms' name on a paper and all names written by the whole group were tabulated as living and nonliving with the whole class. Moreover, three geometry lesson plans included make believe play. One of them was making students to pretend some objects in the kitchen, the other two were about the geometric shapes. Students were planned to make improvisations as if they were some sort of geometric shapes.

Dramatic moment involves a tension or a conflict coming from the participants or the context (Wright, 2001). In order to construct dramatic moments, some techniques, such as; role playing, improvisation, still image, hot seating, forum theatre, consious alley (Kitson & Spiby, 1997) can be used according to the purpose of using creative drama. In all science and mathematics lesson plans, role playing and improvisation were used as drama techniques. In addition to them, the participants used plenty of the drama techniques for their science and mathematics topics in a creative manner in their lesson plans. For example, role cards written for the characteristics of living and nonliving organism were used in pair improvisation in one science lesson plan. In another lesson plan, the

question of “Are plants live or alive?” was considered as a dilemma in one of the students’ mind and tried to be answered in a conscious alley. In five of the science and mathematics lesson plans out of 12, improvisation stage had dramatic moment in nature. For example in one of preservice teachers’ lesson plans in science, each of the students in classroom decided on a plant, like asparagus, cabbage, spinach, sugar cane, cocoa plant and shrubs. Then in pairs they carried out the improvisation based on the properties of the plant that she/he decided to be. If needed, the teacher entered to the role and corrected the knowledge or completed the missing knowledge. The teachers’ acting was not spontaneous but she/he mediated her/his teaching purpose through her/his involvement in the creative drama. In the other improvisation, the students formed groups and each group was given different plant pictures living in the same garden and then each group made an improvisation relating to the living styles, living habitats, nourishment and the parts of the relevant plant in the picture. There was a competition between the groups since each group tried to prove to be the best plant in the garden so the dramatic moment leading to the tension was properly established. For the geometry lesson plan for the third grade, as a dramatic moment an obstacle was planned for students. Students were supposed to form certain geometric shapes having edges, however for the shape of circle they would not have an edge, thus a conflict to be solved would occur. In another plan for the fourth grade, students were planned to be the geometric groups who had a meeting to decide on the best geometric group. In this meeting each group was planned to explain its’ superiorities to prove that they were the best. A tension was planned to occur at this point. As a drama technique, private property and still images were used in lesson plan in Grade 1. Still image was used by making photographs of a kitchen. The participant planned to lead an improvisation about 10 seconds before and after that photograph.

However, some of the participants had some confusion between plays and drama techniques, these teachers used the drama techniques which are normally used in improvisations, as a warm-up activity. For instance, in one of the science lesson plans, conscious alley was used as a play during warm-up activities, not in improvisations to solve a conflict about a dilemma. In another lesson plan, the students compose 3 still images in groups based on the direction of the teacher in warm-up stage related to the effects of people on environment unit. Although the use of this technique as a warm-up can be discussed, the application of the technique was correct in this plan. The images that students formed were all about the people and environment. The still images formed by the groups were about the people burning brazier, industrial foundation, forests and erosion which were all serving to the aims of the lesson. During improvisation stage, a drama technique called “writing in role” was applied. Students made groups and each group is asked to write a letter to an industrial company working near seaside about what they can do to deal with pollution.

In creative drama, group work is the major component for all of the stages. The teacher role is facilitator for developing the ideas for students, encouraging students in creative drama activities and leading them to effective interactions within the group and the students’ role is active participant at the each stage of creative drama and each phase of the science or mathematics lesson by doing, expressing, justifying, discussing, criticizing, and peculiarly imagining. In all of the science and mathematics plans, these components were valued and applied throughout the lesson plans.

3.3. Related to the Perceptions of the Participants about Using Creative Drama in Science and Mathematics Classrooms

Perceptions of participants were taken related to the appropriateness of using creative drama in science and mathematics classrooms, the requirements for science and mathematics classrooms to apply creative drama, possible disadvantages of using this teaching method in science and mathematics, and the suggestions for implementing creative drama successfully by interviewing participants at the end of the procedure. All of the participants agreed that creative drama can be used effectively since they thought that students can learn science and mathematical topics by enjoying and having fun. For instance; one of the participants said that; “*With the help of creative drama, students can accomplish the essential knowledge and skills by considering their own experiences.*” The participants confirmed the idea that any material can be used in creative drama activities. The

classroom environment may include better lighting, comfortable places for improvisations, large spaces for warm-up activities, and technical equipments like music player. The disadvantages for using creative drama in science and mathematics classrooms can be classified in three themes; physical conditions, teacher competency, and the method itself. The participants mentioned that, longer time, suitable classrooms and smaller groups are needed in terms of physical conditions. Regarding teacher competency, they claimed that teachers must be experienced in using this method and consider the students' developmental level while using creative drama. Lastly, from the view of participants, creative drama can not be used just to have fun, if it is so, it would not serve to the aims of the science and mathematics lessons. Besides, some of the participants thought that, creative drama can not be implemented in every topic in science and mathematics. One of the preservice elementary teachers clarified that; "...using creative drama might be difficult to use in doing experiments in science and solving examples and problems in mathematics". Therefore, gaining procedural knowledge is hard to be achieved by creative drama activities. As most of the students stated, creative drama can not be the only teaching tool for science and mathematics lessons, it should be used complementary to the other teaching methods. The suggestions given by the participants mostly focused on the leader characteristics. Most of them believed that a skilled creative drama leader must be specialized, experienced, and competent in using creative drama as a teaching method in science and mathematics classrooms. The leaders should also assess themselves on every step of lesson plan preparation and application. All of the participants also spelled out that, preservice teacher education about creative drama should be more emphasized in teacher education programs.

4. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to analyse the lesson plans based on creative drama prepared by the preservice elementary teachers. The participants were junior preservice elementary teachers and they will become inservice elementary teachers in two years. Therefore, for them the degree of integrating new teaching methods, like creative drama in their science and mathematics lessons is an important component of their professional development. After the analyses of those lesson plans, it can be advocated that the preservice elementary teachers generally prepared qualified lesson plans considering the stages and components of creative drama and the general understanding of science and mathematics. However, two main missing points in those lesson plans should be enlightened. Improvisation is the most crucial element of creative drama (Andersen, 2004; Urian, 2000). Without improvisation stage, a creative drama lesson plan on any topic for any lesson can not be considered as an accurate and complete plan. In a few lesson plans, the researchers encountered this problem. Secondly, the confusion of certain notions relevant to creative drama like; plays, drama techniques, and improvisations was observed in a very few lesson plans. However, these two missing points in preservice elementary teachers' lesson plans can not be perceived as a drawback for them, since it was their first time to experience creative drama in science and mathematics education. Thus, with more experience in creative drama is needed for preservice teachers in their education program. This can be achieved by increasing the lesson hours about creative drama courses and offering new courses related to using creative drama in various disciplines in universities.

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