



EFFECT OF CREATIVE DRAMA METHOD ON GEOMETRY TEACHING

Nesrin Özsoyⁱ,
Burcu Boztürk Macit,
Pınar Melike Karataş,
Yıldız Akkaya

Aydın Adnan Menderes University,
Faculty of Teaching,
Teaching of Mathematics and Science Department,
Aydın, Turkey

Abstract:

Geometry holds an important place in the developmental process of mathematical thinking. When geometry is the subject in mathematics lessons, it is seen by students as an unlikeable and hard to understand. It is not easy to get students who come to school with this prejudice to like the lesson and explain it. Our aim in this research is to eliminate this prejudice using right teaching methods and make mathematics a lesson attended voluntarily and with pleasure by the students. With this aim in mind, the effect of creative drama method on students' success for the 6th grade mathematics lesson, area of triangles subject has been researched. This study has been applied on 100 students enrolled in two different state secondary schools in Aegean Region in 2017-2018 teaching term. In this study, classes are divided into two groups as control group and experimental group and a success test designed by researchers on area of triangles subject is applied to students as pretest and final test. This test consists of 7 multiple choice and 3 open ended questions. Data obtained from the test is analyzed by statistical method. After the analysis, a meaningful difference in favor of experimental group has arisen. Based on the reviews made with the students, it is noticed that the interest of students to mathematics lesson has increased as a result of creative drama applications.

Keywords: creative drama, teaching of mathematics, area of triangles

ⁱ Correspondence: email nesrinozsoy@yahoo.com

This paper was presented at International Conference on Mathematics and Mathematics Education held between June 27-29, 2018 in Ordu, Turkey.

1. Introduction

Creative drama is the explanation and revival of a memory, an event, an idea, an education unit, sometimes and abstract concept or behavior by individuals in a teamwork using improvisation, role playing, etc. or theater or drama techniques through the reorganization of old cognitive patterns and the observation, experience, emotions and experiences in a “game” process (San, 1991).

Baykul (1999) states that structural features of a subject play a great role as well as characteristics of students while acquisition of behavior in a subject area. Mathematics is accepted as a difficult lesson by students since it is not easy to understand abstract concepts. For this reason, it is stated that by using concrete tools and by concretizing the teaching of mathematical concepts, it will be possible to eliminate or at least diminish this hardship. Emotions of appreciate and value mathematics should be developed and discovering and creating process should be given more importance.

As for the conceptualization of some abstract subjects and formulas in mathematics, it is important for students to learn by associating concrete experiences with their own lives, by living and seeing. Dramatic items and games included in creative drama methods increase students’ interest in mathematics, create a positive behavior and mathematics subjects (Erdoğan, 2008; Yenilmez and Uygan, 2010).

It is thought that creative drama is one of the most effective methods to realize teaching of mathematics based on constructivist philosophy, student centered and activity based as foreseen in the renewed primary and secondary mathematics teaching programs and this method also constitutes the main roof of this study. The fact that creative drama is a process resulting from individuals’ own experiences and provides a alive teaching environment for participants is an important feature (San, 1995). With effective usage of this method, it is observed that language and narration abilities have improved, students enjoyed participating the lesson and teaching has reached the aimed result more easily. Simultaneously, with the help of its features, creative drama offers an enjoyable atmosphere besides keeping the student active. The student is faced with real life situations in a fictive atmosphere. Permanent learning is provided since the students learn by doing and experiencing (Bahar, Bertiz and Yeğen, 2010; Avcı and Agun, 2012; Aytaş, 2013; Aykaç and Köğce, 2014).

Drama puts the creativity, communication skill, concrete and abstract thinking capabilities of the student to the foreground. In addition to this, drama carries the feature of being an effective method for maximizing student success by letting students actively participate in the learning process and creating a variable learning environment based on real life experiences (Aykaç and Köğce, 2014).

Duatepe ve Akkuş (2006) stated teaching based on creative drama will activate students in learning process of the mathematical concepts, make it possible for students to share their mathematical thoughts and allow them to learn mathematics by understanding and making associations on the other hand stated drama based teaching facilitates learning process of mathematics. They also indicated that this method makes

it possible to present geometrical concepts and problems in a context and creates a learning environment based on communication and cooperation by letting students move (role play) as a characters. It is also emphasized that drama attracts the students and crates a motivating and attractive learning environment and therefore improves a positive attitude in students (Duatepe, Paksu and Ubuz, 2009).

Mathematics is one of the most important tools known for improving thinking and it is not just about using numbers, we apply to mathematics while shopping, using time, cooking and calculating the invoices. Finding a solution to a problem, solving a puzzle and playing mind games are also mathematics (Özsoy and Yüksel 2007; Umay, 2003).

If creative drama which is a method, a discipline and an art teaching tool at the same time, can be used in teaching of mathematics we will have taught primary school students who have not passed by their game age mathematics, improved their creativity and therefore made the concept of mathematics happy (Özsoy, Güneş, Yüksel, 2002). Learning by doing and experiencing makes information learnt by students more permanent (Özsoy and Yüksel, 2007).

Reducing the fear of mathematics is one of the most important points on improving a positive attitude and behavior towards mathematics, increasing effectiveness and concretizing capacity of the methods used for raising the success in mathematics. For this reason, it is believed that creative drama is the most suitable method for making students love mathematics, showing them that they can be successful and satisfy their needs (Avcı, 2012). Since lessons carried out with drama are enjoyed by students and they learn by doing and experiencing, the lesson becomes more permanent (Gül Gümüş, 2017).

Most of the studies made by creative drama are related to other subjects of geometry. This study has been carried out to assess the effect of drama method in triangles area subject in two different secondary schools in two different cities in Aegean region.

2. Method

2.1 Sample

The scope of this research is two different state secondary schools in two cities in Aegean Region. In these cities, two schools were chosen as samples with the help of cluster sampling method. In the sample, there are 6th grade students of the chosen schools. There are two classes of 6th grades with 25 students in each city. There are 100 students in total in the sample. The socio-economic status of the families of these students is mediocre.

2.2 Research Question

This research has been carried out to increase the interest and success of students by using drama method in teaching of geometry. It is thought that research findings will be effective in creating an opinion on usage of drama method in teaching of geometry.

For this reason, in the scope of this research, the question “Is There Any Effect of Creative Drama Method in Teaching of Geometry on Students’ Success?” In the framework of this question, below problem will be handled:

- 1) Is there any meaningful difference between the final test results of experiment group students applied drama method and control group students applied traditional method?

2.3 Research Pattern

Experimental and observation based research pattern are used in this research carried out in order to determine the effect of drama method in geometry teaching on students’ success and interest for the lesson.

In order for a research to be experimental, test subjects must be appointed objectively to the experimental process conditions (Büyüköztürk, 2007; Büyüköztürk and etc., 2013). In this research, pre-final test control grouped experimental pattern is used.

2.4 Data Collecting Tool

With the aim of testing existing information level of students on the subject of triangles area, experiment and control groups were applied pre-test. Both groups were given final tests in order to assess the success after the application. Observational process was applied for assessing the interest of the students to the lesson.

Procedures realized to experiment and control groups before, after and during the experiment are indicated in the experiment pattern. Below table shows the experiment pattern of this research.

Table 1: Pre-Final test Control Grouped Pattern (Büyüköztürk, 2007)

Groups	Pre-test	Process	Final test
Eg	Pt1	Creative drama	Ft1
Tg	Pt2	Traditional teaching method	Ft2

Eg symbol in the cart indicates experiment group to which applied the drama method for the lesson and Tg indicates the control group to which applied the traditional method. According to the applied method, both groups are given pretests before the lesson (Pt 1, Pt2) and final tests after the lesson (Ft1, Ft2) designed by researchers.

Success assessment test has been developed by the researchers according to the acquirements indicated in the “triangles area” unit and with the help of lesson and workbooks sent by Ministry of Education. Test includes 10 questions in total out of which are 7 multiple choice and 3 open ended questions. In order to provide the validity of the scope of the test, acquirements of the triangles area subject were determined and enough questions have been prepared for each acquirement. Questions were examined by experts, 3 mathematics teachers and 2 experts working in the Ministry of Education and reached its final form with revisions. The final version was also examined by a linguist.

1 hour for pre-test, 1 hour for final test and 1 hour for the activity application; this study takes 3 hours in total. Data collection tool is limited to the information test. A drama activity plan is prepared for the lesson. Reviews have been made with the experiment group students.

2.5 Data Analysis

This study is applied to 6th grade students of two state secondary schools of two cities in Aegean region in 2017-2018 spring teaching term. There two 6th grades in each city. One of the classes is chosen as the experiment group while the other is chosen as the control group.

Before the explanation of the subject, both groups are given pre-tests in order to assess the equality of the information level on triangles area subject. After the equality of the groups is determined, application process is started. Experiment group is taught by the Creative Drama method. Before the lesson starts, chairs are lined as U and a free space is provided to the students. Suitable tools are used through the lesson activity. As for Control group, Traditional Teaching Method is used. Blackboard and lesson books are used as tools. Same time period are allocated to the acquirements and lessons are started and finished at the same time. After the application, pre-test questions are given to the both groups as final tests in order to assess the learning level of the experiment and control groups. Besides this, interest of the students to the lesson is observed in experiment and control groups separately. Statistical methods and t-test is applied in data assessment process.

During the analysis of research findings, distortion values and assessment test applied to the groups are controlled first with kolmogorov smirnov normality test in order to see if the findings have normal dispersion. Later, difference between the final test scores are examined as the assessment of learning levels of experiment and control groups. During the comparison of creative drama method applied experiment and traditional method applied control groups' final tests, "independent groups t test" is used.

3. Findings

Table 1: Experiment and Control Groups' Mathematics Success Assessment Pre-test Scores

Student Groups	Number of Test Subject (N)	Arithmetical Avarage	Standard Deviation (SD)	Degree of Randomness (DR)	T value	Level of Meaningfulness (P)
Experiment group	50	31,5	14,97	58	0,17	0,987
Control group	50	31,56	16,05			

There is a difference of 0,06 between the arithmetical average of experiment and control group. In order to see if this difference is meaningful, T test is applied and result is found as 0,17. Since $P=0,987>0,05$ (%95 trust gap) it is decided that there is not a

meaningful difference between experiment and control groups. Therefore, success levels of experiment and control group is equal to each other.

Table 2: T-test results of Control group mathematics success pre and final tests

Control group	Number of test subjects	Arithmetical average	Standard Distortion (SD)	Degree of randomness	T test value	Level of meaningfulness (P)
Pre test	50	31,56	16,05	29	-5,088	0,00
Final test	50	48,95	20,7			

According to the T-test results of dependent groups, difference between the averages is =19,36. T test=-5,088. Between the pre and final tests of control group is P=0,00 Since <0,05 there is a meaningful difference between the results.

Table 3: T-test results of Experiment group mathematics success pre and final tests

Experiment group	Number of test subjects	Arithmetical average	Standard Distortion (SD)	Degree of randomness	T test value	Level of meaningfulness (P)
Pre test	50	31,5	14,97	29	-11,418	0,000
Final test	50	77,5	16,43			

According to the T-test results of dependent groups, difference between the averages is 46. T test=-11,418. Between the pre and final tests of experiment group is P=0,00 Since <0,05 there is a meaningful difference between the results.

Table 4: Findings of final test results of experiment and control groups mathematics success assessment

Student groups	Number of test subjects	Arithmetical average	Standard Distortion (SD)	Degree of randomness	T test value	Level of meaningfulness (P)
Experiment	50	77,5	16,43	58	-5,445	0,000
Control	50	50,93	21,06			

There is a difference of 26,57 between the arithmetical average of experiment and control group. In order to see if this difference is meaningful, T test is applied and result is found as -5,445. $P(0,000) < 0,05$ (%95 trust gap)

According to this result, it is understood that there is a meaningful difference between the experiment and control groups.

Positive results are acquired in the reviews made with experiment group. The participants indicated their contentment with the application of creative drama method. Students said things like “we haven’t noticed how the time flew”, “this subject is so easy”, “teacher, can we do this for a lesson again?”, “we have understood this subject so well” and “teacher, please ask questions about this subject in the exam”.

4. Conclusion

This research is made for determining the effect of the creative drama method on 6th grade mathematics lesson 'triangles area' subject.

In this research, the answer of the question "Is there any meaningful difference between the final test results of experiment group students applied drama method and control group students applied traditional method?" is examined. A meaningful difference in favor of experiment group is found between the success levels of traditional method applied control group and creative drama method applied experiment group. This result is parallel with Gül Gümüş (2017) and Özsoy (2003).

As a result of the observations made in the research process it is found that students who don't have any interest in the lesson have participated actively, students have learnt by enjoying, participated voluntarily to the lesson, participated to the activity eagerly and moved in cooperation and associated information given with their daily life. Students acquired information on where to use this subject in their Daily life. They also tried to make inferences in mathematics lesson. When they are reviewed, students indicated that lesson has passed quickly and subject is not difficult. This result supports Gül Gümüş (2017) and Özsoy (2003).

In control group where applied traditional teaching method, students who are eager to learn have participated in the lesson. Students with medium level of eagerness have chosen memorizing. The method failed to raise interest of the students who have no interest to the lesson.

Creative drama making students active in learning process, encouraging them to speak up, supporting them to try to solve the problems with their own ways or making group discussions, providing permanent learning instead of memorizing and letting students to make inferences with other subjects in mathematics can be used specifically on geometry and on mathematics teaching more generally when used with other methods.

It is possible to mention the difficulties experienced in the process in addition to the beneficial nature of the drama method. Students may conceive the process as a game and may not consider this as a lesson since they do not have enough information drama. For this reason, teacher may need to introduce drama to students, prepare the students to the process with drama activities and hold the control through the process. A crowded class may become a problem for including all students in the activity. The teacher should also be trained for drama in order to prepare the plans, manage the process effectively and control the class. Teacher or the leader needs to have necessary capability and expertise in the field to increase the motivation of the students. It may be challenging for the teacher to prepare the environment, plans and materials for drama in time. At the same time, class hours may be inadequate and the anxiety for completing the official program may limit the applicability of drama method to be used frequently in classes. For this reason, activity plans should be arranged suitable to the conditions. In addition to these, some parent may consider drama as a game or theater

play and may have fears for the exams, managers may not have enough information on the method and these may cause problems for the method to be applied.

4.1 Suggestions

1. Resource books may be published for teacher to use, activity plans should be increased in numbers for different subjects and lessons.
2. Researches may be increased in number in order to determine the applicability of the Drama method to different subjects and different class levels.
3. Creative drama trainings may be widespread for teachers and school managers.
4. Creative drama class may be arranged in schools. By doing this, class arrangement problem will be eliminated.

References

- Avacı Agun, B. (2012). Primary developing activities appropriate for planned drama prepared in the classroom mathematics teaching. Master Thesis. Rize University, Institute of Social Sciences, Rize.
- Aykaç, M. ve Köğce, D. (2014). Sınıf Öğretmenlerinin Matematik Derslerinde Yaratıcı Drama Yöntemini Kullanma Durumlarının İncelenmesi. *Tarih Okulu Dergisi (TOD)*, 17, 907-938.
- Aytaş, G. (2013). Eğitim ve öğretimde alternative bir yöntem: Yaratıcı drama. *Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 12, 35-54.
- Bertiz, H., Bahar, M. ve Yeğen, G. (2010). The Attitudes of Prospective Science and Technology Teachers Towards Creative Drama Method and Their Views on Using the Method in Science and Technology Education *Journal of Gazi Educational Faculty (GUJGEF)*, 30(2).
- Baykul, Y. (1999). İlköğretimde Matematik Öğretimi. Ankara: T.C. MEB Projeler koordinasyon Merkezi Başkanlığı.
- Baykul, Y. (2009). İlköğretimde Matematik Öğretimi 6-8. Sınıflar. Ankara: Pegem A Yayınları.
- Büyüköztürk, Ş. (2007). Deneysel Desenler Öntest- Sontest Kontrol Grubu Desen ve Veri Analizi. Ankara: Pegem A Yayıncılık.
- Duatepe-Paksu, A. & Ubuz, B. (2009). Effects of Drama-Based Geometry Instruction on Student Achievement, Attitudes, and Thinking Levels, *The Journal of Educational Research*, 102(4).
- Duatepe, Paksu, A., Ubuz, B. (2007). Yaratıcı Drama Temelli Matematik Dersleri Hakkında Öğretmen Görüşleri. *Yaratıcı Drama Dergisi*. Sayı 3-4. (Kış/Yaz 2007).
- Duatepe, A., Akkuş, O. (2006). Yaratıcı Dramanın Matematik Eğitiminde Kullanılması: Kümeler Alt Öğrenme Alanında Bir Uygulama. *Yaratıcı Drama Dergisi*. Sayı 1. (Yaz 2006).
- Erdoğan, S. (2008). Drama ile Matematik Etkinlikleri. Ankara: Nobel Yayın Dğitim.

- Gül Gümüş Hasibe (2017), The effects of Creative Drama in Mathematics Teaching in terms of the Achievement , Attitude and Retention Levels of Students. Master's thesis Mersin University Institute of Educational Sciences, Mersin, Turkey.
- Özsoy, N. (2003). Using Creative Drama As A Method of Teaching Mathematics in Elementary School. Journal of Balıkesir University. 5(2) 112-119.
- Özsoy, N., Güneş Ö, Yüksel D.E. (2002) Drama in Math. Education, IEC 2002, Changing Times, Changing Needs First International Education Conference, , Famagusta, North Cyprus, May 8-10.
- Özsoy, N., Yüksel, S. (2007). Drama in Mathematics Teaching. Journal of Buca of Faculty of Education. 21: 32-36.
- San İ., Yaratıcı Dramanın Eğitsel Boyutları, Yaratıcı Drama 1985-1995 yazılar (Prof. Dr. İnci SAN'a armağan), Ed: H. Ö. Adıgüzel, Naturel Yayıncılık, 113-122, 1991.
- Umay. A. (2003). Mathematical Reasoning Ability Matematiksel Muhakeme Yeteneği. Journal of Hacettepe University Education Faculty. 24: 234-243.
- Üstündağ, T. (2002). Yaratıcılığa Yolculuk. Ankara: Pegem A Yayıncılık.
- Yenilmez, K. & Uygan, C. (2010). Yaratıcı Drama Yönteminin İlköğretim 7. Sınıf Öğrencilerinin Geometriye Yönelik Öz-yeterlik İnançlarına Etkisi. Kastamonu Eğitim Dergisi, 18(3) 931- 942.

Appendix

Appendix 1: Creative Drama Method Usage In Secondary School Mathematics Lessons Activity Plan

Subject: Triangle's Area.

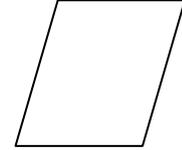
Grade: 6.

Time: Three lesson hour.

Aim: Calculating triangles area.

Behaviors:

1. Finding the height of the triangle kinds and drawing it;
2. Calculating area of the triangle kinds;
3. Calculating the area of a triangle with the given height and base;
4. Obtaining triangles from squares and calculating the area.



Material: Rectangle, square, equilateral square and parallelogram out of cardboard, paper, scissors, pencil

Role of the student: Engineer, technician, client, land owners

Learning and Teaching Techniques

1) Warm up

Students walk with music. When the music stops, students are asked to do what is said with the clap of the leader. Students are asked to make a triangle with their hands. Hands clap and music begins again. Students make triangles with a couple, with triple and walk with music. They make a triangle with four people and walk with music, they make triangle with five and six people later.

2) Roleplay

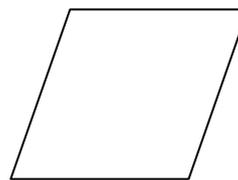
Four people come to an engineer's office. They have square, quadrangle, parallelogram, equilateral square land plans in their hands. All four have the same request. They want their lands area to be divided into two. Group is divided into four.

Each group is given one figure to divide.

To groups: "Why these land owners want their area to be divided into two equal parts? Asked.

Each group is given cardboard squares and asked to divide it into two. (Each group works at least two figures by turn.)

They are asked to calculate the areas and tell this to the class.



Interval assessment

Teacher asks each group how they can do the same thing with other ways.

3) Assessment

1. Please share your experience and emotions.
2. They are asked what figure it is that they obtained and discussed.
3. Area formulation of the calculated triangle is asked.
4. Can you give examples similar to this in your daily life?
5. Create a story, poem, tale or a picture about triangle area.

Creative Commons licensing terms

Author(s) will retain the copyright of their published articles agreeing that a Creative Commons Attribution 4.0 International License (CC BY 4.0) terms will be applied to their work. Under the terms of this license, no permission is required from the author(s) or publisher for members of the community to copy, distribute, transmit or adapt the article content, providing a proper, prominent and unambiguous attribution to the authors in a manner that makes clear that the materials are being reused under permission of a Creative Commons License. Views, opinions and conclusions expressed in this research article are views, opinions and conclusions of the author(s). Open Access Publishing Group and European Journal of Education Studies shall not be responsible or answerable for any loss, damage or liability caused in relation to/arising out of conflicts of interest, copyright violations and inappropriate or inaccurate use of any kind content related or integrated into the research work. All the published works are meeting the Open Access Publishing requirements and can be freely accessed, shared, modified, distributed and used in educational, commercial and non-commercial purposes under a [Creative Commons Attribution 4.0 International License \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).