

The Effects of Using Creative Drama in Science Education on Students' Achievements and Scientific Process Skills

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ABSTRACT. The purpose of this study is to investigate the effect of creative drama-based instruction on fifth graders' science achievements in the light and sound unit and scientific process skills. This quasi-experimental research was conducted in one of the public elementary schools in Turkey during 2009-2010 academic year. A light and sound achievement test was developed and administered to randomly selected 60 students. The experimental group was instructed through creative drama-based implications and the control group was never exposed to creative drama. An instruction material including five lesson plans was constructed for the leader to administer creative drama-based instruction. The unit was instructed to each group for three weeks. A science achievement test and a scientific process skills test were administered to each group as pre-post test. An independent sample t-test revealed that there were significant differences in the means of creative drama applications, science achievement and scientific process skills.

Keywords: creative drama, science education, scientific process skills, achievement, light and sound

INTRODUCTION

Evidence from many studies makes it clear that many students are not learning scientific process skills as they need or are expected to learn it (Chuang and Cheng 2002; Ergin, Şahin-Pekmez, Öngel-Erdal 2005). Especially in Turkey, students' scientific process skills achievement is lower than the other contents of science curriculum such as their conceptual content, attitudes and values, and science-technology-society-environment. Through the Third International Mathematics and Science Study (TIMSS), the science and mathematics achievement of eighth-grade students in 38 countries was measured. Of the 38 participating countries, Turkey was in the 31st in terms of the average of general science education scores (Bagci-Kilic 2003).

A new science, technology, society, and environment (STSE) oriented science education reform has been developed and carried out by the Ministry of National Education (MNE) in Turkey. The aims of the new science curriculum can be summarized as: to help teachers orient from the traditional mode of instruction to teaching science with a more constructivist approach, an emphasis on technology and society, and finally a focus on preparing students as scientifically and technologically literate individuals (MNE, Board of Education 2004).

In Turkey, students learn scientific process skills in the primary and secondary science classes. Solving science problems is a process in which investigative/inquisitive activities aim at giving opportunities for students to solve a problem using their skills and their conceptual framework (Gott and Duggan 1995). By doing these, students use their skills of applying scientific processes. These skills are divided into two groups (Şahin-Pekmez, Aktamış, Can 2009). The first one is the basic skills which include observation, classification, communication, measurement, estimation, prediction and inference. The second one is the integrated skills which are identifying and controlling variables, hypothesizing, experimenting, drawing graphs, interpreting and modeling activities (Martin, Sexton, Wagner, Gerlovich 1998).

The scientific process skills contain not only the skills encountered in the science areas, but also the skills we face in many areas in daily life (for example: measuring, estimating, etc.). The scientific process skills should be used in the acquisition of knowledge processes. They can only be called as scientific as long as they are used. In the studies done to develop scientific process skills, it was seen that students had achieved each scientific process skill after passing some stages (Saat 2004). These stages were determined as recognizing the scientific process, habit-forming, and automating. At the first stage (recognizing), the student recognizes the skill at either the lower grade science course lectures or the learning environment which the researcher had prepared. Controlling the variables can be given as an example. Then, the student recognizes the terms related to these skills, for example, variables. After that students test their hypothesis depending on variables. At the second stage (habit-

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forming), the student approaches to the skill, gives different examples related to the skill, but cannot apply this skill to other conditions since he/she confuses and feels ambiguity. At the third stage (automating), the student can easily define the terms related to the skill and can transfer the skill to other conditions. In order to pass these stages easily, students should have pre-knowledge and they should also be supported by simple scientific activities for practicing. Gagne (1965 as quoted in Taşar et al. 2001) considers that the subjects taught to students should be similar to what scientists do (the process they experience in scientific activities). Then, what do scientists do? They observe, categorize, measure, try to bring to a conclusion, propose hypothesis, and do experiments. If scientists construct knowledge by this method, the primitive forms of what they do could also be taught in elementary school years to teach children to construct their own knowledge. Of course, it should not be concluded as if everyone should be a scientist.

Previous studies (Ewers 2001; Myers 2004; Turpin 2000) examined students' understanding and conceptions concerning the scientific process skills. Turpin (2000) researched the effect of activity-based science curriculum on science achievement, scientific process skills and attitude toward science. Students who use activity-based science curriculum program had higher scores in the field of science achievement and scientific process skills than students who use traditional program. Myers (2004) researched the effect of laboratory of research on students' scientific process skills and achievement of subject knowledge regarding learning styles, gender and race. Behaviour groups that break with three levels are; the field of subject approach without laboratory experiment, the field of subject approach that supply laboratory experiment and the field of subject approach with research laboratory experiment. Results of the study showed that students who learned by research laboratory approach or the field of subject approach that supply laboratory experiment had higher content knowledge and scientific process skills than students who learned by traditional laboratory approaches. Ewers (2001) researched the effect of two different teaching methods (teacher-centered and learning circle) on self-efficacy and scientific process skills. Primary school student teachers who join two parts of the basic science course constitute the sample of the study. Two teaching methods that form teacher-centered and learning circle are used to teach scientific process skills in the part of laboratory of science course. Each group showed an important acquisition about scientific process skills sufficiency.

Why Creative Drama Works?

Drama-in-Education (DIE) generally refers to the use of drama process as a way to teach variety of subjects or to supplement a school's curriculum (Heathcote & Bolton 1995). This methodology, widely used in British and Australian education, emphasizes the experience and process of creating drama rather than producing a performance. DIE is distinguished from Theatre-in-Education in that it does not have pre-written and rehearsed materials. According to Johnson and O'Neill (1995), "drama is no longer considered simply as another branch of art education, but as a unique teaching tool, vital for language development and invaluable as a method in the exploration of other subject areas" (p. 42).

Creative drama is one of the techniques used in DIE. Creative drama is a type of creative plays consisting of acting many types of plays, a universal art and an improvisation required for human being (Cottrell 1987; McCaslin'e 1990). Creative drama can simply be defined as performing improvisations about an event or a concept by using participants' past experiences. The term improvisation here means spontaneously using of movement and speech to create a character or an object in a particular situation (Gallagher 1997). From the perspective of education, it can be described as a method of teaching and learning that involves students in spontaneous and unscripted learning sound and light. Students are active learners in creative drama based learning environments so the students have to get a chance to construct their knowledge in their minds through meaningful learning activities. Fundamentally, the value of drama comes from simulating real life situations and experiences so that students can think that the learning atmosphere is familiar. The classroom environment of creative drama provides a framework that actually engages students in the learning process. They are encouraged to construct knowledge which is categorized as a constructivist teaching method. Students are active participants in the learning environment in creative drama based instruction (Courtney 1990; Heinig 1988; Wilhelm 1998). Social constructivism sees knowledge as a product of social interaction mediated by activities and cultural tools, such as language (Vygotsky 1978). Learning is always a social process. Creative drama provides participants with Zones of

Proximal Development ZPD. Vygotsky defines ZPD as “the distance between the actual developmental level as determined by independent problem-solving and level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (p.86). Social interaction which promotes the construction of common interpretations of events and objects is very important in this method (Heathcote & Herbert 1985). During the activities, generally students work in groups that provide active communication among them and between students and teacher. Students are supported to express their ideas by using both and verbal/nonverbal communication. Specifically when we consider the usage of creative drama in science education it can be said that it facilitates meaningful learning, which is the primary goal of science teaching (Littledyke 2004). The above descriptions display that creative drama was an effective learning method in cognitive, affective, and psychomotor development of students.

Literature Review Related to Creative Drama

In field literature, two fundamental approaches of the creative drama have been emphasized. The former is including the creative drama within the curriculum as an art, and considering it as an activity contributing to child’s personal development. The latter is using it as a method in educational process in different disciplines such as history, linguistics, mathematics, etc (Arieli 2007). Our examination of the literature on creative drama indicated that few studies have focused on the use of creative drama in science education (Çokadar and Yılmaz 2010; Kamen 1992; KasPolisini and Spector 1992; Özdemir and Üstündag 2007). Çokadar and Yılmaz (2010) researched the effect of creative drama based instruction on seventh graders’ science achievements in the ecology and matter cycles unit and their attitudes toward science. Result of this study revealed a statistically significant difference between mean scores of the both groups with respect to achievement in the ecology concepts and medians of the attitudes toward science in favor of the experimental group after the treatment. Kamen (1992) designed a study to investigate the effect of creative drama in enhancing student understanding of science concepts. The study was carried out in two elementary classrooms in which drama based instruction is used as part of science instruction. Written tests for the students; interviews with students and teachers; and direct observations were the four measuring tools of the study. The results indicated that the students’ achievement improved on the content tests. Both the students and the teachers reported benefits from drama, including a better understanding of the concepts and an improved motivation and interest in learning science. The students enjoyed the use of drama based instruction and felt they learned more when this method was included. Kase-Polisini and Spector (1992) described a quantitative study in which high achieving science and mathematics students studied science concepts through creative drama. For eight consecutive summers, a group of students attended a two-week program that was designed by a theater education professor and a science educator professor. Participants were instructed to produce a play to dramatize the specific math and science concepts they were taught during the two-week experience. The researchers found drama based instruction to be an effective strategy for teaching science. Özdemir and Üstündag (2007) used creative drama based instruction for teaching history of science to prospective science teachers regarding the life story of three famous scientists and their contributions to science. Their results showed that the participants’ comprehension and curiosity were increased.

There are many studies proving that the creative drama had affected on many different fields such as science, mathematics, life knowledge, linguistics, psychology, etc. (Duatepe and Ubuz 2004; Kaf 1999; Oğur and Kılıç 2005; Sarıçoban 2004; Yılmaz 2000) and on affective properties (Akoğuz 2002; Freeman, Sullivan 2003; Yassa 1999; Walsh-Bowers, Basso 1999) in our country and abroad. In fact, information peculiar to a subject area is not permanent, at least it rapidly changes. The fundamental, permanent, and unchangeable thing is the supportive learning products (Açıköz 2003). These research studies display that creative drama had developed the supportive learning products.

Research Objectives

The present study meets the twofold goal of investigating the benefits of creative drama-based instruction in science education and exploring the effects of creative drama based instruction on scientific process skills. Moreover, this study presented the relationship between the benefits of creative drama based instruction and instructional practice under theoretical evidence.

The Purpose and Significance of the Study

In this research, it was intended to determine the effects of the Creative Drama Applications on students' Scientific Process Skills and Science achievement at light and sound unit of 5th grade Science and Technology Course. The creative drama education can be seen as a choice in educating the individuals by century's popular teaching methods by providing opportunities for the individuals to interact and communicate with the environment and others, and to comprehend the world themselves (Üstündağ 1998). However, it is thought that the studies related to the teacher candidates and teacher education on creative drama method which is effective on the cognitive and affective, psychomotor learning, should have become widespread throughout the country. In addition, only a few research studies had determined the effects of the creative drama applications on students' science achievement and scientific process skills. Thus, this research study is arose from this necessity, and expected to contribute to science education literature from this perspective.

Research Question:

What is the effect of applying creative drama for teaching light and sound unit at Primary School 5th grade Science and Technology Course on students' achievement and scientific process skills?

METHOD

The research has the quasi-experimental design. The research had been performed at randomly selected primary schools. Before determining the experimental and control group classes, science achievement test, and the scientific process skill test were applied in the primary schools at Bağbaşı region. Socio- demographic structures of the students in the classes and the achievement levels were similar. Science teachers volunteered to participate in the study. The students existing in the study group were determined through the convenient sampling method. The experimental and control groups were selected randomly from within four available classes at the schools. In total, 60 students participated in the study.

Participants

The sample of this study consists of 5th grade primary school students. The primary schools at Bağbaşı District of Denizli, Turkey Province constitute the population of the research.

Measures

To collect data for this study, the "Scientific Process Skills Test" and the "Achievement Test" were used. These scales are described below.

Scientific Process Skills Test (SPST): The original test was developed by James R. Okey, Kevin C. Wise and Joseph C. Burns. Translation and adaptation of the test to Turkish were conducted by Özkan, Aşkar and Geban (Yavuz, 1998). The scale is convenient for Primary School 6th grade students. However, since our subjects consist of 5th grade students, the scale was examined, and some items existing in the scale were removed from the scale since it was considered that they were not convenient for 5th grade level. The scale originally consisting of 36 items was transformed into 26-item scale. 26-item scale was applied on totally 227 6th grade students at randomly selected four primary schools.

At the end of the application, the differentiation index, and difficulties of the items, and the reliability coefficient of the scale were calculated. At the end of the calculation, the questions having an item differentiation index below 0,20 were removed from the scale. Hence, the scale measuring the scientific process skills and consisting of 26 multiple choice items had been obtained. The reliability coefficient of the obtained scale (KR-20) was 0,80. The scientific process skills test was applied as both pre-test and post-test on experimental and control groups.

Achievement Test(AT): In the research an achievement test was developed for measuring how much the students gained the learning outcomes of light and sound unit. It was developed by following learning outcomes reported in Primary School Science and Technology Curriculum. The initial test was developed by the researcher from the related literature and the curriculum. The test initially consisted of 25 multiple choice questions and was applied with 320 students from 4 different primary schools as a pilot study. After the pilot application, the test items were analyzed. Differentiation index and item difficulty levels were determined, and the items having lower measuring power were removed from the test. In addition, 3 experts and 3 experienced science teachers from different primary schools were consulted, and it was determined by using the questions in which the experts'

and the teachers' ideas were compatible with each other. The last form of the test has 20 questions. The reliability coefficient Kuder Richardson (KR20) of the test was found as .70. As Özçelik (1989; 209) stated, the reliabilities of the tests prepared to be used in group comparison can be between 0,60-0,80. Therefore, the application was performed by thinking that reliability of the test was sufficient. The achievement test was applied as both pre-test and post-test on each group.

In the treatment period, although the experimental group learned science with creative drama-based instruction, the control group learned them as recommended in the science curriculum. In the control group, curriculum science instruction was used. This instruction included lecture and discussion methods. The teacher summarized all topics and asked questions to students and discussed the important concepts. The treatment period lasted 3-weeks (45 min period was 4 class hours). The developed lesson plans included the unit and was developed by considering criteria of drama-based instruction. These lesson plans were tested on pilot groups of sixth- grade students from a school other than the one in the main study to test their appropriateness for the specified topics, applicability in classroom settings, and attractiveness to the students. Each lesson plan included three main parts: In the *introduction* phase, warm-up activities were used to prepare the students to be involved in make-believe play for the rest of the lesson, work together in harmony, and trust each other. They also helped them to relax and have fun. The *development* phase required students to experience and live ideas embellished with science objects in some roles. In the *quieting* phase, the main points of the lessons were emphasized, and then the key points of the covered concept were summarized by either the teacher or students. Students reviewed what they had learned either by answering or solving the questions posed by the teacher or presenting what they had learned as an improvisation that required the use of the knowledge learned (Duatepe and Ubuz 2004). Also, all of the lesson plans were piloted on a six grade class in a public elementary school to check whether the lesson plans could be applied in the classroom, how the classroom management was, and directions were clear, the objectives could be achieved. Lesson plan 1 and its implementation were given in Appendix 1 and Appendix 2.

Treatment was performed on 59 5th grade students at a Primary School at Denizli in April and May at 2008-2009 academic year spring semester. During the application, the lectures in the control group were given traditionally (question-answer, lecture, summary, homework). However, in the experimental group, the lecture was given by creative drama applications (Preparation-Warming Up, Animation and Evaluation-Discussion) by the researcher. The activities were used for the instruction. In each lesson plan, there were three phases: introduction, development, quieting.

In the *introduction* phase, warm-up activities were used to get ready to work together in harmony, and to trust each other and to have fun. The students were allowed to play games at the beginning and were introduced to the subject matter in 10 min or less.

In the *development* phase, students generally worked in groups of 4-7, individually, or with the whole class. In general, students were introduced to the make-believe plays which required them to act as if something were happening or to pretend to be someone else. And also students were prompted by dramatic moments (Duatepe and Ubuz 2009). It included non-verbal representation like gesture or movement. While facilitating, the teacher emphasized learning through discovery by means of posing questions. The teacher sometimes participated in the activities in order to encourage students. It also provided more effective relationships between the teacher and the students.

In the *quieting* phase, the key points of the concept covered were summarized either by the teacher or by the students. Students reviewed what they had learned either by answering or solving the questions posed by the teacher or presenting what they had learned as an improvisation that required the use of knowledge learned (Duatepe and Ubuz 2004).

Procedures and Analysis

This study was quasi-experimental design with a pre-and post-test application. For data analysis, the multiple-choice questions were classified as correct (one point), incorrect (zero point) and blank (zero point). The maximum score for AT was 20. In comparing the mean scores of experimental and control groups at the pre-test, independent t-test was performed. After the treatment period, the instruments were administered to both groups as post-test to determine the change in students' scientific process skills and science achievement.

RESULTS AND DISCUSSION

When the experimental and control groups were compared at pre-test by independent t-test (Table. 1) , it was found that there was a non-significant difference between experimental and control group. This indicates that experimental group (M=25,33) and control group (M=27,24) were almost equal in their science achievement ($t_{38}=0,64$; $p>.05$)

Table 1. *The t-test table of the scores which the experimental and control groups got from pre and post achievement tests*

	(N)	M (Max. score:20)	SD	T	p *
Pre test (experimental)	31	25,33	9,64	3,75	0,001
Post test (experimental)	31	60,72	12,92		
Pre test (control)	29	27,24	11,99	3,69	0,001
Post test (control)	29	36,62	12,23		

$p < 0.05$

On the other hand, independent sample t-test analysis of the post-test scores showed that a statistically significant difference between the experimental group (M= 60,72) and the control group (M=36,62) . Students' academic successes had occurred in favor of the experimental group after the experimental process ($p < .05$). Although achievement scores of both groups increased after the treatment, the experimental group had higher improvement than the control group.

Table 2. *The t-test table of the scores which the groups got from pre and post scientific process skills tests*

	(N)	M (Max. score:26)	SD	T	P
Pre test (experimental)	31	12,35	3,74	8,76	0,000
Post test (experimental)	31	19,42	3,73		
Pre test (control)	29	10,87	3,71	1,25	0,219
Post test (control)	29	11,90	2,94		

$p < 0.05$

To compare the students' pre and post scores of scientific process skills, SPST was administered to both groups before and after treatment. In order to examine the effectiveness of the used teaching approach on students' scientific process skills, the scores acquired in pre- and post –tests of the SPST to the both groups were analyzed separately. As seen in Table 2, independent t- test results showed a statistically significant difference between the control and experimental groups mean scores on the SPTS in favor of the experimental group ($M=19,42$; $SD=3,73$ and $M=11,90$; $SD=2,94$; $t=8,76$; $p<.05$).

CONCLUSION

In this research, at the end of the light and sound science units instruction, there was a statistical significant difference between the achievement and scientific process skills test of students of the experimental group where the creative drama education had been applied and the control group taught through teacher-centered instruction in favor of the experimental group. The pre test was determined whether the mean achievement scores of 2 groups were statistically different or equal. These showed both groups to be equivalent. When the instruction was completed, students in the experimental group showed a higher mean score for achievement than those of the control groups. Also, achievement scores of two groups increased after the treatment, the experimental group had higher improvement than the control group. Creative drama activities enabled the students of experiment group to gain a significantly better acquisition of scientific knowledge than those of control group. It has been determined that the creative drama had developed the problem solving, critical and creative thinking, linguistic and communicational skills of the participants; had helped them to develop in self-efficacy, empathy, respect, and socialization subjects; had increased their sensorial awareness, and had eased them to remember (Adıgüzel 1994; Annarella 1992; Cottrell 1987; Johnson 1998; Yassa 1999; Walsh-Bowers, Basso 1999). Briefly, the creative drama is a method providing important contributions to personal, social, and educational development of the participants. Because creative drama is one of the most successful group working methods providing to learn by interaction and living (San 1996), it can be said that individuals' experiencing these positive contributions of creative drama could only be possible by correct guiding of this process by effective leaders.

In the light of this research and the related research studies (McCaslin'e 1990; Annarella 1992; Freeman et al. 2003; Oğur and Kılıç 2005), it can be said that the Creative Drama Applications enable students to learn lessons more enjoyably and entertainingly.

The current research was conducted to explore the effects of creative drama-based instruction on the achievement of students in science and their scientific process skills. These results showed that the creative drama based instruction caused a statistically better acquisition of light and sound and improvement of scientific process skills than the teacher centered instruction in the fifth grade students.

The following suggestions based on the results can be put forward;

- This research had been performed at Primary School 5th grade Science and Technology Course light and sound unit. Therefore, research providing the opportunity of being tested also in different courses at the other education stages with larger sample sizes is suggested.
- As well as the effects of Creative Drama applications on students' success and scientific process skills, also their effects on communication, empathy, ego perception, self sufficiency, social skills should also be investigated.
- It is suggested that different research studies should be done related to determining the effects of Creative Drama applications on students' gender, parents, socio-economic conditions which they lived.
- It is thought that studies related to teacher candidates and teacher education on creative drama method which is effective on the cognitive and affective, and psychomotor learning during the education process should become widespread in our country.

REFERENCES

- Açıkgöz, K. Ü. (2003). *Active learning and teaching*. İzmir, Kanyılmaz Press.
- Adıgüzel, H. Ö. (1994). New method and discipline in education: creative drama. 1. pedagogy congress statement book, *Çukurova University Pedagogy Faculty*, Volume 2.
- Akoğuz, M. (2002). *İletişim Becerilerinin Geliştirilmesinde Yaratıcı Dramanın Etkisi*, Yayınlanmamış Yüksek Lisans Tezi, Ankara.
- Annarella, L. A. (1992) *Creative Drama in The Classroom*. (ERIC Document Reproduction Service ED:391206).
- Arieli, B.B. (2007). The integration of creative drama into science teaching. University of Kansas. Phd. Thesis.
- Bagcı-Kılıç, G. (2003). Third International Mathematics and Science Search (TIMSS): Science Teaching, Scientific research and nature of science. *Journal of Elementary Online*, 2(1), 42-51.
- Chuang, H.F and Cheng, Y.J (2002). The relationships between attitudes toward science and related variables of junior high school students. *Chinese Journal of Science Education*, 10(1), 1 - 20.
- Cokadar, H., Cihan-Yılmaz, G. (2010). Teaching ecosystems and matter cycles with creative drama activities. *Journal of Science Educational Technology*, 19, 80-89.
- Cottrell, J. (1987). *Creative drama in the classroom*. National Textbook Company, Illinois.
- Courtney, R. (1990). *Drama and intelligence: A cognitive theory*. Montreal, Canada: McGill-Queen's University Press.
- Duatepe, A. ve Ubuz, B. (2004). *Drama based instruction and geometry*. The 10th International Congress on Mathematics Education. Available online at: <http://www.icme-10.dk/index.htm>, p.TG14. (Accessed 3.11.2006).
- Duatepe, A., Ubuz, B. (2009). Effects of drama-based instruction on student achievement, attitudes, and thinking levels. *The Journal of Educational Research*, 102, 272-286.
- Ergin, Ö., Şahin, E. Ş. and Öngel, S. E. (2005). *From theoretical to practice science teaching through experiment*. İzmir, Dinazor Bookstore.
- Ewers, T.G. (2001). *Teacher-Directed versus learning cycles methods: effects on science process skills mastery and teachers efficacy among elementary education Students*. PhD Thesis. The University of Idaho.
- Freeman, Gregory D., Sullivan, Kathleen, Fulton, C. Ray (2003). Effects of creative drama on self-concept, social skills, and problem behavior. *Journal of Educational Research*, 96(3).
- Gallagher, M. (1997). *Drama in education: adult teaching and learning for change in understanding and practice*. Unpublished PhD Dissertation, University of Wisconsin-Madison, USA.
- Gott, R. & Duggan, S. (1995). *Investigative work in the science curriculum*. London, Open University Press.
- Heathcote, D. & Bolton, G. (1995). *Drama for learning : Dorothy Heathcote's mantle of the expert approach to education*. Portsmouth, NH: Heinemann.
- Heathcote, D., & Herbert, P. (1985). A drama of learning: Mantle of expert. *Theory Into Practice*, 24, 173-180.
- Heinig, R. B. (1988). *Creative drama for the classroom teacher*. Upper Saddle River, NJ: Prentice Hall.
- Johnson, A. P. (1998). *How to Use Creative Dramatics in the Classroom*. Childhood Education, Fall 1998.
- Kaf, Ö. (1999). *Hayat bilgisi dersinde bazı sosyal becerilerin kazandırmasında yaratıcı drama yönteminin etkisi*. Yayınlanmamış Yüksek Lisans Tezi, Çukurova Üniversitesi, Adana.
- Kamen, M. (1992). *Creative drama and the enhancement of elementary school students' understanding of science concepts*, DAI-A 52/07, 2489. The University of Texas, Austin.
- Kase-Polisini, J. & Spector, B. (1992). Improvised drama: A tool for teaching science. *Youth Theatre Journal*, 7 (1), 15-19.
- Littledyke, M. (2004). Drama and Science. *Primary Science Review* 84, 14-17.
- Martin, R. Sexton, C. Wagner, K., & Gerlovich, J. (1998). *Science for all children*. Boston, Allyn and Bacon.
- McCaslin'e, N. (1990). *New Directions in Creative Drama*, *National Forum*, Summer90, 70.

- MNE, Board of Education (2004). *Elementary science and technology (4-8th grades) programs*. Ankara, National Education Press.
- Myers, B.E.(2004). *Effects of investigative laboratory integration on student content knowledge and science process skill achievement across learning styles*. PhD Thesis, University of Florida.
- Oğur, B. ve Kılıç, B. G. (2005). The effect of students' science achievement on integrated drama in science lessons. *Journal of Education Researches*, 20.
- O'Neill, C. (1995) *Drama worlds: A framework for process drama*. Portsmouth, NH: Heinemann.
- Özcelik, D., A. (1989). *Test Preparation Guide*. OSYM Education Press.
- Ozdemir P, Üstündağ, T (2007) Creative drama curriculum related to the scientists in science and technology. *Elementary Education Online (No. 2)* <http://ilkogretim-online.org.tr>. Accessed 27 May 2011.
- Pekmez, E. Ş. (2000). *Procedural understanding: Teachers' perceptions of conceptual basis of practical work*. PhD Thesis, University of Durham.
- Saat, R.M.(2004) The acquisition of integrated science process skills in a web-based learning environment. *Research in Science & Technological Education*, 22 (1).
- San, İ. (1996). A method that improved creativity and discipline that trained creative individual: pedagogical creative drama. *Journal of New Turkey*, 2(7), 148-160.
- Sarıçoban, A. (2004). Using drama in turkish teaching as a foreign. *Journal of Education Researches*, 14.
- Şahin-Pekmez, E., Aktamış, H., Taşkın-Can, B. (2009). Exploring scientific creativity of 7th grade students. *Journal of Qafqaz University*, 1302 – 6763, 204-214.
- Taşar, M., Temiz, B.K., Tan, B.K. (2001). *Student Acquisitions That Aimed at is Classified According to Scientific Process Skills in Elementary Science Teaching*. <http://www.gazi.edu.tr/~mftasar/publications/BSB.pdf>. Accessed 25 January 2006.
- Turpin, T.J (2000). A Study of the effects of an integrated, activity-based science curriculum on student achievement, science process skills, and science attitudes. Upon The Science Process Skills Of Urban Elementary Students. *Journal of Education*, 37, 2, 1996.
- Üstündağ, T. (1998). The items of creative drama education. *Journal of Education and Science*, 107(22).
- Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Walsh-Bowers, R., Basso, R. (1999). Improving early adolescents' peer relations through classroom creative drama: an integrated approach. *Social Work in Education*, 21(1).
- Wilhelm, J. D. (1998). Not for wimps! Using drama to enrich the reading of young adult literature. *Alan Review*, 25(3), 36–40.
- Yassa, Nevine A. (1999). High school involvement in creative drama. *Research in Drama Education*, 4(1).
- Yavuz, A. (1998). *Effect of conceptual change texts accompanied with laboratory activities based on constructivist approach on understanding of Acid-Base concepts*. Yayınlanmamış Yüksek Lisans Tezi, The Graduate School of Natural and Applied Sciences of The Middle East Technical University.
- Yılmaz, T. (2000). *An approach of a model offer connected with intonation skills earn with creative drama method in turkish*. Master Thesis, Ankara.

Fen Öğretiminde Yaratıcı Drama Kullanımının Öğrencilerin Akademik Başarılarına ve Bilimsel Süreç Becerilerine Etkisi

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ÖZ. Bu çalışmada, İlköğretim beşinci sınıf Işık ve Ses ünitesindeki Yaratıcı Drama Uygulamalı Öğretimin öğrencilerin fen başarısı ve bilimsel süreç becerileri üzerindeki etkileri araştırılmıştır. Araştırma yarı deneysel bir çalışma olup, Denizli’ de bir İlköğretim Okulu beşinci sınıf öğrencileri (n= 60) ile 2009-2010 öğretim yılının II. döneminde toplam 6 hafta süresince yürütülmüştür. Beşinci sınıflardan 2 şube rastgele örnekleme yöntemi ile seçilmiştir. Deney grubunda dersler Yaratıcı Drama Uygulamaları ile işlenirken, kontrol grubunda programdaki gibi işlenmiştir. Araştırmada kullanılan ön ve son testler bağımsız gruplar için t testi ile SPSS 12.0 paket programı kullanılarak analiz edilmiştir. Sonuç olarak, Yaratıcı Drama Uygulamalarının beşinci sınıf öğrencilerinin fen başarılarında ve bilimsel süreç becerilerinde anlamlı bir etkisi bulunmuştur.

Anahtar Kelimeler: yaratıcı drama uygulamaları, fen eğitimi, bilimsel süreç becerileri.

ÖZET

Amaç ve Önem:Bu çalışmada, yaratıcı drama uygulamalı öğretimin ilköğretim beşinci sınıf öğrencilerinin bilimsel süreç becerilerine ve fen başarılarına etkili olduğunu araştırmak amaçlandı. Alanyazında da bahsedildiği gibi, bilimsel süreç becerileri ve fen başarılarını etkileyen pek çok değişken bulunmaktadır. Bu değişkenlerden en etkili olanı yaratıcı drama yöntemi olduğu yapılan çalışmalarda yer almaktadır. Alanyazında yaratıcı dramanın, öğrencilerin yüksek sesle düşünmelerine; duygularını beden yoluyla yansıtma ve tanımlanma ile birlikte; bilgilerini düzenlemelerine, sentezlemeye, özgün ürünler yaratarak bu ürünleri, işbirliği ortamında iletişim yoluyla gruplar içerisinde sergilemelerine fırsat verdiği belirtilmektedir.

Yöntem: Bu çalışmada yaratıcı drama uygulamaları bağımsız değişkeni ile fen başarısı ve bilimsel süreç becerileri bağımlı değişkenleri arasında anlamlı bir ilişki olup olmadığını araştırmak için nicel bir yöntem kullanıldı. Araştırma yarı deneysel desen modelindedir. Araştırmada İlköğretim 5. sınıf öğrencilerinden oluşan deney ve kontrol grupları ile çalışılmıştır. Araştırmanın evrenini Denizli İli Bağbaşı semtindeki İlköğretim Okulları oluşturmaktadır. Araştırma raslantısal olarak seçilen bir İlköğretim Okulunda yürütülmüştür. Deney ve kontrol sınıflarının belirlenmeden önce Bağbaşı İlçesi’ndeki ilköğretim okullarına fen başarı testi, bilimsel süreç becerileri testi uygulanmıştır, sınıflardaki öğrencilerin sosyo-demografik yapıları ile başarı düzeylerinin yakın olmasına ve fen öğretmenlerinin araştırmaya katılmaya gönüllü olmalarına dikkat edilmiştir. Çalışma grubunda yer alan öğrenciler, uygun örnekleme yöntemi ile belirlenmiştir. Araştırmanın örneklemini 60 öğrenci oluşturmuştur. Veri toplamak için “Bilimsel Süreç Becerileri Testi” ve “Başarı Testi” kullanıldı. 26 maddeden oluşan 5 dereceli likert tipindeki bilimsel süreç becerileri testinin güvenilirlik katsayısı 0.80 dir. Diğer taraftan 20 maddeden oluşan başarı testinin güvenilirlik katsayısı 0.70 dir. Verilerin analizi sırasında istatistiksel çözümlerde SPSS 11.0 paket programı kullanılmıştır. Öğrencilerin ön testten aldıkları puanların karşılaştırılmasında aritmetik ortalamalar arasındaki farklılığı belirlemek için t testi yapılmıştır.

Bulgular: Yaratıcı drama uygulamalarının öğrencilerinin fen başarılarını ve bilimsel süreç becerilerini etkileyip etkilemediğini anlamak için yapılan t testi sonucunda, yaratıcı drama uygulamalarının öğrencilerinin fen başarısını ve bilimsel süreç becerilerini etkilediği görüldü ($p < .05$). Öğretiminin yapıldığı deney grubu ile programdaki uygulamanın yapıldığı kontrol grubu öğrencilerinin başarıları ve bilimsel süreç becerileri testi açısından deney grubu lehine anlamlı bir fark bulunmuştur.

Tartışma, Sonuç ve Öneriler: Araştırmanın bulgularına göre, altı haftalık bir yaratıcı drama uygulamasının çalışma grubunun fen başarılarını ve bilimsel süreç becerilerini etkilediği bulundu. Öğretiminin yapıldığı deney grubu ile programdaki uygulamanın yapıldığı kontrol grubu öğrencilerinin başarıları ve bilimsel süreç becerileri testi açısından deney grubu lehine anlamlı bir fark bulunmuştur. Bu araştırmanın ve ilgili araştırmaların ışığında Yaratıcı Drama Uygulamaları sayesinde öğrencilerin dersin zevkli ve eğlenceli bir şekilde öğrenilmesini sağladığı söylenebilir. Aynı zamanda her iki grupta başarı testi sonuçları artmıştır.

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Appendix 1

See Table 3.

Table 3. *The comparison of the first lesson plan*

Category	Experimental Group	Control Group
Physical Environment	The desks were arranged to create an empty space in the center of the classroom.	Regular classroom environment
Introduction	At the beginning of the lesson students were told that they were going to the park. After the walking, when they were told that they arrived at the park and asked to stand provided that everyone saw these students and asked the animate what they had heard while walking in the park.	The teacher explained the sound. They define different sound sources and define that the sounds of substances which made of different matters are different.
Development	Students were grouped including 4-6 guys and were introduced to two dramatic moments: finding out a) Is the sound higher when you crash two stones into each other in the river? b) Is the sound higher when you crash two stones into each other outside by the river?	Teacher explained the sound sources by writing the blackboard. Afterwards teacher explained that same matters create different sounds in different surroundings. Teacher gave examples. If we crash two stones into each other in the water, we hear different sounds.
End of the lesson	Students explain with another example that because of two different surroundings sounds were different.	The teacher allowed the students to write the explanations in their notebooks.
Teacher's role:	Teacher asked sounds of like a glass, a porcelain cup, a basketball substances are the same or different. Is spread surrounding of sound exchange when the sound sources are the same? Does a bird sing different in the air or down?	Giving information about to the sound sources.
Students role:	Students' experiences involved behaving as a frog in a brook. Students discuss in groups and make predictions about how sound would come out. They reach on an agreement about how sounds would come out in the end.	Listeners, passive receivers, worked alone.

Appendix 2**See Table 4.****Table 4.** *The evaluation of the first lesson plan*

Student role	Behaving as a person in a park, walking along the park
Teacher role	As a leader, facilitating for students. Asking questions to the classroom like “Are the sounds the same when we crash the same materials into each other? Are the sounds the same when we crash the same materials made of the same substance?”
Warm-up activities	Students were walking as if going to the park, talking in the role of playing a frog. Students provided that everyone sees each other animating a frog in the park.
Dramatic moments	Task or context given students decide the cast and improvise their act. Students improvise one frog that how this frog perceive the differences of voice when crash two stone each other in the river and out of the river.
Quieting activities	Students were asked how the sounds of glass, pliers, basketball etc... would differ in different surroundings.