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CREATIVE DRAMA AND EXAMPLE OF ACTIVITY PLAN IN STEM

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Abstract:
What our century requires is an individual who can recognize and solve a problem, think in a critical manner, are productive, responsible, and open to innovation, and are capable of cooperating with others. The requirements of our era are also reflected on education. Education systems change and improve accordingly; thereby new education systems are discussed. One of these education systems is STEM, which is an acronym of Science, Technology, Engineering and Mathematics. STEM is an educational approach, which integrates education with the application opportunities provided by technology and engineering that are based on the fields of science and mathematics and which includes all stages of education from pre-school to higher education. In this study, creative drama method and its applicability on STEM education process have been discussed. Problem solving, creating a problem, approaching a problem from different perspectives, and mathematical thinking skills, all of which are among the objectives of STEM, correspond to the acquisitions of creative drama. Considering this, it can be argued that creative drama, which is an interdisciplinary work, is an effective teaching method enriching the learning environment for STEM that is an integrated learning. A creative drama activity plan that can be improved by being used in STEM applications has been presented in the appendix.

Keywords: STEM, creative drama, mathematics education, science education, activity plan

1. Introduction

What our century requires is an individual, who can recognize and solve a problem, think in a critical manner, are productive, responsible, and open to innovation, and are capable of cooperating with others. The requirements of our era are also reflected on

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education. Education systems change and improve accordingly; thereby new education systems are discussed. One of these education systems is STEM, which is an acronym of Science, Technology, Engineering and Mathematics. STEM is an educational approach, which integrates education with the application opportunities provided by technology and engineering that are based on the fields of science and mathematics and which includes all stages of education from pre-school to higher education. This study focuses on the argument that creative drama can be used as a method in STEM applications. It is expected to raise individuals with the skills of 21st century, through STEM education. STEM is an interdisciplinary approach, thus integrating the concepts and skills in different STEM fields and applying them on a real-life problem or event enables students to learn these concepts and skills in a more meaningful manner (Akgündüz et al., 2015; Çorlu, Capraro, & Capraro, 2014; Yıldırım & Altun, 2015; Gülhan & Şahin, 2016).

The STEM studies were initiated by National Science Foundation (NSF) in the USA in 1990's. The results of the previous study suggest placing STEM trainings and activities in curricula, in 2003, STEM was added to the graduate studies in Virginia Tech University and STEM produced its first graduates in 2005. Following this, the STEM studies have rapidly started to become popular in the USA, and STEM has been viewed as a solution to the economy of the country. Ever since then, STEM studies have been receiving support from the state (Roberts, 2012; Bybee, 2010).

Besides being product-oriented, STEM education also bares such 21st century skills as critical thinking, creativity, innovation, problem solving, productiveness, and responsiveness. STEM education provides a refreshing learning environment for the content of a curriculum. It enables students to make new inventions, to understand the connection between events and to produce new products by improving their self-confidence and self-sufficiency through collaboration and individual work. While doing these activities, students learn how to think in a flexible manner and to find economical and simple solutions to the problems they face with.

Literature review suggests that there are various studies on STEM education at its impact. In their study that was conducted to determine the impact of STEM education applications consisting of educational play-supported coding trainings, on the attitudes of students towards coding trainings and to detect the feelings and views of the students through the applications, Keçeci, Alan, & Kırbağ Zengin (2017) state that the students thought they would have difficulty at the pre-application process but found it enjoyable and easy after the application. Moreover, in the diaries where students explained their views and feelings on the science activities, the students mentioned that the applications were entertaining and many of the students repeated the guided-research and questioning activities at home with their families.

In their study carried out to detect the teacher views on pre-school STEM applications, Şahin, Özgenol, Akbulut, Hascandan, & Güley (2014) found that STEM applications improved the courage of pre-school children, allowed for permanent learning, and using materials with STEM activities produced positive results in enabling students to act and comply with in groups.

2. Creative Drama

According to San, creative drama is the activity process, in which a word, a concept, a behavior, a phrase, an idea, a memory or an event is restructured by making use of improvisation, role playing, theatre or drama techniques or by developing games through group work with the help of previous cognitive patterns (San, 1991). These refer to the animation, improvisation and actions the participants develop based on their own ideas, creative inventions, and knowledge without a previously-written text (San, 1998).

The elements of creative drama include drama leader (teacher), playgroup, and work environment. In creative drama, processes are created according to the improvisation principle. There is no written text. The limitations of the study are determined by the group leader. Each application aims at creating a whole. Turning an application into demonstration is optional. Each participant has to be unprejudiced, willing to work in a group and ready to learn new things. As every study field, creative drama also has a study discipline but do not have strict rules. It offers freedom, yet is not in a disorder. The experiences and process itself is more important than the product (Öztürk, 2001).

According to San (1991), creativity is revealing and creating connections among 'things', which were not connected before. The process of creative drama exists in all cognitive and intellectual activities as well as in all types of work and occupation. Creativity can be found as a fundamental element in each work completed by a human being. Creative drama undertakes the application aspect of creativity in education. Creative drama allows for learning through experience, instead of memorizing.

According to Somers, the concept of drama in education is both used as a method in various fields such as mathematics, music, language, and history, and as a tool to support individual development and artistic productivity in "drama classes" (Somers, 1994). The drama approaches that can be used in education include "Processual Drama" and "Expert Role" approaches. Processual Drama has been added to the literature by Dorothy Heatcote, Gavin Bolton, and Brian Way. This concept can be defined as a drama, which do not consist of only one work, is extended over a time, and is based on a problem and teaching-oriented (Heathcote & Bolton, 1995; Akar Vural & Somers, 2015).

Expert role approach enables students, especially in elementary school, to comprehend events and facts, to view them in a multi-dimensional manner, and to discuss them in depth. The approach should be problem-oriented and children should definitely take the role of an expert (mathematician, scientist, engineer, technician, computer expert, doctor etc.) in drama. The essence of this approach is enabling children to become responsible and authorized while trying to solve a realistic problem and to play the role of an expert (Akar Vural & Somers, 2015).

According to Doroty Heatcote, in expert role approach, children should be enabled to realize the problem and to take responsibility by giving them the role of an

expert. Teacher explanations should be given in the role and all children should participate (Pennington, 1999, op cit. Akar, 2000).

Although the process of creative drama applications may not always be the same, it usually involves the stages of Warm-Up, Verbal and Non-Verbal Role Playing, Improvisation and Formation, Relaxation and Evaluation. The elements of creative drama include drama leader (teacher), participants (playgroup), and work environment (Adıgüzel, 1993; San, 1996; Öztürk, 2001).

Creative drama evokes the imagination of participants, allows them to develop their own ideas, and improves creativity. It also develops the critical thinking and communication skills of the participants. The problem solving skills are improved through assumption in open-ended activities and solving the dilemmas in the process. Multiple sense organs are prompted and become active. Creative drama improves independent thinking, raises awareness, and creates social and psychological sensibility towards others. Moreover, it helps the participants with their self-confidence and decision-making skills. Creative drama improves the four fundamental language skills (speaking, listening, reading, and writing) of the participants. It develops the skills of making plans and decisions as well as producing solutions with a group. The participants concretize abstract events and concepts through creative drama, which also increases their motivation and diversifies learning styles. Thereby, the participants become willing to reach and use information. It teaches how to appreciate others as well as to discuss and to come to an agreement with others (McCaslin, 1996, 2006; Öztürk, 2001; Baldwin & Fleming, 2002; Tuluk, 2004; Önalan Akfırat, 2006).

The creative drama studies and applications in the field of mathematics and science, which are some of the fundamental fields of STEM, resulted in positive contribution of creative drama to mathematics and science teaching; furthermore, these studies suggest that students learn by entertainment, which provides a permanent learning, and contributes to the development of metacognitive knowledge (Özsoy, 2003; Ersoy, 2014; Horasan Doğan & Özdemir Şimşek, 2017).

3. STEM and Creative Drama

The researches on STEM applications have lately been focusing on pre-school and early childhood period. These studies do not only focus on the applicability of science and mathematics, which are some of the fields of STEM, in pre-school period, but also on the fact that these applications are effective in enabling pre-school children to acquire the skills of 21st century and on the importance of starting to provide children with STEM acquisitions starting from pre-school, since their creativity level is at maximum during this period (Greenfield et al., 2009; Saçkes, Akman, & Trundle, 2012; Uyanık Balat & Günşen, 2017). The studies conducted in this direction initiate the applied STEM activities that are based on science and mathematics education during the pre-school period. The most convenient method among these activities conducted during the pre-school period is directed questioning-oriented teaching method, which is

guided by the teacher (Saçkes, Akman, & Trundle, 2012; Horasan Doğan & Özdemir Şimşek, 2017).

Playing is another way to improve the STEM skills of pre-school children (Snow 2011 akt. Uyanık Balat & Günşen, 2017). Plays can be used in STEM activities on the significant concepts and skills, which are desired to be acquired, in a planned manner. Especially pre-school children are inquisitive and curious towards what is around them incşuding objects and events. It is possible to develop STEM skills and knowledge by allowing students to ask questions and create hypothesis within the scope of the plays (Uyanık Balat & Günşen, 2017).

The previous studies agree on the fact that creative drama is an effective teaching method in the education of science mathematics, which are some of the fundamental fields of STEM (Özsoy, 2003; Özsoy, Özyer, Akdeniz, & Alkoç, 2017). It is observed that in international studies creative drama techniques are useful, beneficial and effective in various education programs including STEM, furthermore the results of the previously conducted studies support this view (Bailey, 1993; Stencel & Barkoff, 1993; Duveen & Solomon, 1994; Kentish, 1995; McCaslin, 1996; Jablon, 2017).

4. Conclusion

STEM activities are formed after going through a well-organized preparation process (needs analysis and planning), designing process (developing activities and projecting), and application process. What matters at this point is including children in the process and ensuring that they help controlling the process (Yılmaz, Gülgün, & Çağlar, 2017). It is observed that these results display similarity with the process of planning a creative drama as well as the application process.

It is observed that problem solving, creating a problem, approaching a problem from different perspectives, and mathematical thinking skills, all of which are among the objectives of STEM, correspond to the acquisitions of creative drama. Considering this, it can be argued that creative drama, which is an interdisciplinary work, is an effective teaching method enriching the learning environment for STEM that is an integrated learning (Özsoy, 2017).

In order to make use of creative drama in STEM applications, it is possible to prepare and apply an activity plan that is suitable for the certain objectives of STEM. At the stages of improvisation and evaluation, it is possible to produce a product by integrating students' science and mathematics knowledge with technology and engineering opportunities. Thereby, the students could try to produce a product that would be suitable for the objective within the framework of collaboration and responsibility in a group as well as for the purpose of problem creation and solving, which are among the objectives of STEM. From this perspective, it is believed that using creative drama in the process of STEM application could be helpful and could enrich and contribute to the affective aspect of education in STEM applications.

4.1 Creative Drama Activity Plan:

Objective: Creating a product from geometrical figures, which suit the purpose

Acquisitions: Improving the skills of problem creation and solving, planning and creating a product through collaboration

Class Level: 5th Grade

Time: 3 course hours

Techniques: Role-playing, improvisation, expert role approach, small group work, teacher's role, role cards, brainstorming

Material: Interlocking objectives created from geometrical figures, music player

Warm-Up: Each student picks a piece from the material box and each individual starts to work while listening to music. The students are asked to walk with the music. When the music stops, the students pair with one another and they introduce the figure to the other student as if the figure was himself for instance, cube John, circle Leo, square Annabella etc. The students start telling the features of the figure as if they were their own features. After doing this for a couple of times the students start to tell a different characteristic of themselves every time they come across with each other. When the music completely stops, every one finds a suitable place for themselves in the environment and settles. The students are then divided into four groups including scientists, technicians, engineers, and mathematicians. The teachers ask students to pick a name for their occupation group, which starts with the initials of their names. Angle Alice, Bridge Bridget, Biologist Bernard, Code Clinton etc. The teacher asks students to walk with the music and the music starts playing. When the music stops, each student grabs their figure and starts to introduce themselves to the closest student to them. This is repeated for a few times. .

Fore text: Once upon a time, there were two villages surrounded by fruit and vegetable gardens in greens that could meet their own needs and where people lived happily under the blue skies and where people cared for neighborhood relations and respected the elder and loved the younger. Those people were happy in their villages. However, there was a beautiful river that flew splashingly between the two villages. The people of these two villages wanted to pass over the river and meet. The teacher creates 4-people groups by collecting one student from the scientists, technicians, engineers and mathematicians groups. Each of these groups live in one of the villages in the story.

Brainstorming: Why the people of these two villages want to meet, when the meeting will be and what can be done is discussed.

Improvisation: Villagers come together and animate what they will do

Expert Role Approach: Each group is asked to draw a project to bring together the two villages. For this purpose, the engineers, technicians, mathematicians, and scientists research for what can be done for the project and what their duties are.

The teacher visits groups during the designing process and asks them questions such as 'Are you sure this is an economical project? I was wondering the location of it, do you think it looks aesthetical?'.

They look for a solution to a problem while preparing a project for a group work. The students can use the classroom library to research and make a literature review on

their own profession. All projects are displayed and presented. The cost, place, timing, reliability and suitability with the purpose of each project is discussed. Then what characteristics the project that will be carried out for the meeting of two villages is determined. The missing parts are completed. Afterwards, the project is revealed by using the materials in the box.

4.2 Evaluation and Discussion

The groups demonstrate and present their products. The groups explain what they planned while creating the project, whether the plan they followed throughout the application served to the purpose of the product as well as its benefits, and how they felt while conducting the project and at the end of the project. Questions such as '*what did you wish to do?*', '*why did you do it?*', '*what did you use while doing it?*', '*did you make a plan?*', '*did you eventually achieve what you desired?*', '*what can you do to further improve it?*', '*did you like the other products?*', '*what are the advantages and disadvantages of the other products?*' are asked.

P.S.: It can be applied in all classes by making necessary adjustments. The connection among science, technology, engineering, and mathematics should be given in accordance with the class level.

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