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Research Article

Is Drama a Magic Wand or a Waste of Time?

Ayşe Gül ÇİRKİNOĞLU ŞEKERCİOĞLU[1]

[1] Balıkesir University, Necatibey Faculty of Education, Balıkesir/Türkiye,
acirkin@balikesir.edu.tr, http://orcid.org/0000-0001-9474-2977

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Abstract – Several studies revealing that students who receive traditional instruction indicate more interest in lessons in which active learning methods are employed have been conducted. This research aimed to determine the effect of drama-assisted teaching activities on university students' achievements in Electrostatics concepts in Physics-2 class. For this purpose, instruction supported with the drama method was employed in addition to traditional teaching. The study followed a quasi-experimental research design with a control group, and the participants of the study were 83 second year students who studied at an Education Faculty, in the west of Turkey. To collect data, an Electrostatics Concept Test and a Drama Method Attitude Scale were used. As a result of the research, regarding the concept test, scores of the experimental group supported with drama-assisted instruction were significantly higher than the control group. It was found that the experimental group drama attitude mean score was 78.9% positive. According to the results of the research, drama alone is not a magic wand like Harry Potter's wand, but it is a more successful method than traditional methods.

Key words: Conceptual understanding, drama-assisted teaching, drama attitude, electrostatics, university students.

Corresponding author: AyşeGül ÇİRKİNOĞLU ŞEKERCİOĞLU, acirkin@balikesir.edu.tr, Balikesir University

Introduction

In learning physics, lessons which foster characteristics of a traditional teaching setting lack effectiveness. Due to such teaching contexts, it is observed that students' misconceptions remain unchanged after physics lessons, or only a few can be eliminated. Even though they easily solve numeric problems, students have difficulties with conceptual questions. It is

argued that the discrepancy between success at traditional context and failure in conceptual questions stems from the ineffectiveness of traditional instruction methods in terms of contribution to conceptual learning. Additionally, it is evidenced that lessons prompting students to actively participate in the activities help unsuccessful students elevate their achievement levels. Active learning methods are regarded as more effective ways for students to learn physics and chemistry concepts, and compared to traditional instruction; these methods encourage them to be more active during lesson activities (Demirci & Çirkinoğlu Şekercioğlu, 2009; Kaya Eker, 2023; Yıldırır, 2020). According to Açıkgöz (2006), active learning can be described as the process in which the learner bears responsibility for learning, is given opportunities for making decisions concerning various learning dimensions and for self-regulation, and is prompted to use cognitive faculties through complex instructional steps. There are a number of modern teaching methodologies based on active learning (Akbaş, 2011; Çirkinoğlu Şekercioğlu, 2011; Durusoy, 2012; Maharaj-Sharma, 2017; Sedef, 2012; Türkkuşu, 2008; Yağmur, 2010). And drama method in which active student participation is facilitated is one of them. Akar-Vural and Somers (2011) define drama in education as a form that stands for teaching a content item through drama elements, thus regarding drama as a fundamental teaching method. Furthermore, besides using art forms and techniques in education, the main motivation behind drama in education is creating learning situations for learners in which they can experience real occurrences through role playing in a fictional setting. To role-play, one requires knowledge. Knowledge contributes to playing the role appropriately, making learning possible at the same time. Drama in science education has been developed to enable students to understand the topics better, and it includes various activities they might need. Besides, it helps students learn by living, making the classroom enjoyable. Drama applications provide students with opportunities to make use of a language they cannot normally use in their daily lives (İçelli et al., 2008). Although there is a perception that the use of drama is limited to lessons related to social and non-math studies, it generates positive results with math and science lessons when used effectively (Oğuz-Namdar, 2017). There are certain steps to make the use of the drama method effective in classrooms as follows: preparatory/warm up stage, enacting stage, and evaluation/discussion stage. In the preparation phase, participants are facilitated to be prepared for the process of enacting both physically and mentally through introduction, interaction, free walking, plays, rapport, and trust activities. The enactment stage includes all the phases in which a topic is formed with a common effort as the product and presented to an audience. In short, it is the stage during which teaching a topic is put into action. Lastly, the evaluation stage is the final

process in which participants make judgments about activities and topics used in the enactment and a determination is sought after concerning the matching of teaching the topic and learning outcomes (Adıgüzel, 2018; Oğuz-Namdar, 2017). The drama method consists of several techniques such as improvisation, role playing, role exchange, acting teacher, flashback, hot seat, interview, conscience alley, still image (freeze frame), gossip circle, writing in role, internal voice, holding a meeting, pantomime, rituals and ceremonies, family photo, iceberg, thought tracking, etc. (Adıgüzel, 2018; Akar-Vural & Somers, 2011; Karadağ & Çalışkan, 2008). Drama techniques that were used in this study are as follows: role playing, improvisation, hot seat, and writing in a role. Role playing technique is the enactment of some roles assigned to each student. Acting out the character's all thoughts and feelings, students get out of their own personas, which reduces their fear of making mistakes and increases their calmness (Genç, 2003; Güney, 2009; Karadağ & Çalışkan, 2008; Karadağ et al., 2008). Improvisation technique is enacting an unprecedented situation or role assigned to a student without any preparation for the role. However, some basic information must be provided prior to enactment since students must have an understanding of the essence of the topic to improvise (Güney, 2009; Karadağ & Çalışkan, 2008; Okvuran, 1994). Hot seat technique requires one student to sit down to a chair and others to surround him/her to ask various questions related to a topic. In this technique, other students must avoid asking off-topic questions and making comments. Writing in role technique includes writing products such as letters, journals, etc. to generate knowledge, insights, thoughts, and feelings related to a topic by assuming the role of a character, possibly an important figure. It is possible to discuss about the products and make comments (Adıgüzel, 2018).

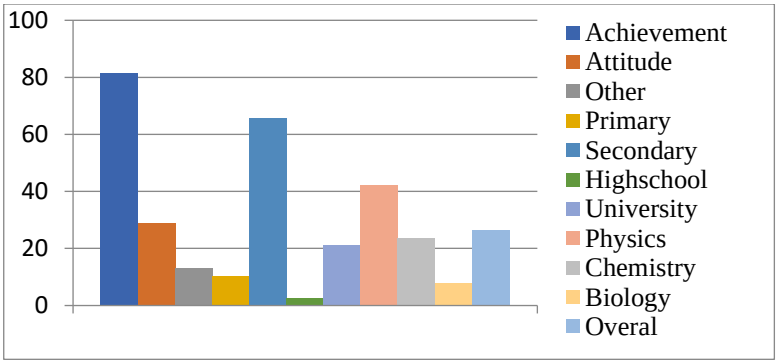

Figure 1 Distribution of research reviewed (2000-2018)

Regarding the studies focusing on the use of drama in science education, the most frequent levels appearing are the research on primary and secondary levels. Among the

research reviewed for the study, 38 experimental studies related to science education were examined in terms of education level, distribution of science fields, and dependent variables. Figure 1 and Table 1 below present the distribution of contents of reviewed research in percentages.

The reviews of the literature revealed that the majority of studies were on the effect of drama on student achievement (81.58%). It was followed by attitude studies focusing on the effect of drama-oriented education on the attitudes of students towards the lesson and subjects (28.95%). In addition, the rest of the studies with regard to drama are as follows: the effect of drama on scientific process skills, drama's effect on scientific creativity, and the nature of science (13.16%). It was observed that the majority of research studies (65.79%) were on the level of secondary school. Drama-oriented studies conducted on university level science teaching indicated an increase in recent times (21%).

Table 1 Characteristics of the studies examined in the literature review (2000-2018)

Properties	**%**
Effect of drama on student achievement	**81.58**
Effect of drama on students' attitudes towards lesson	28.95
Effect of drama on scientific process skills, nature of science, self-regulation	13.16
Research on primary school level	10.52
Research on secondary school level	**65.79**
Research on high school level	2.63
Research on university level	21.05
Research related to drama's effect on teaching on physics subjects	**42.11**
Research related to drama's effect on teaching on chemistry subjects	7.90
Research related to drama's effect on teaching on biology subjects	23.68
Research on drama in relation to general science subjects	26.32

Additionally, when Figure 1 and Table 1 regarding the amount of drama-oriented experimental studies conducted on science fields were observed, it can be seen that the highest number of studies were led in the field of physics (42.11%). Biology field follows physics in terms of number of research papers with a percentage of 23.68%. Rate of drama studies conducted through general science topics which contain physics, chemistry, and biology is 26.32%. It is noticeable that in experimental drama research with regards to physics, the most prominent studies were on the topic "Force and Motion" (Akbaş, 2011; Durusoy, 2012; Maharaj-Sharma, 2017; Sedef, 2012; Yağmur, 2010). Concerning the experimental drama studies on other physics subjects included topics as the following; heat and temperature, electricity, mirrors, sound, light, let's know our planet, and energy (Cihan-

Yılmaz, 2006; Çirkinoğlu Şekercioğlu & Yılmaz Akkuş, 2016; Kahyaoğlu et al., 2010; Sağırlı & Gürdal, 2002; Taşkın Can, 2013; Taşkın & Moğol, 2016b; Tımbıl, 2008; Timothy & Abata, 2014). Considering the research reviewed, it was revealed that the drama method led to a significant increase in both student achievement levels and their attitudes towards the lesson compared to traditional instruction techniques. Even in the cases where there was no significant difference to the control group, student achievement levels were measured to be in higher rates in groups that received drama-oriented instruction. However, in addition to the results indicating that drama instruction increased student achievement, some studies reported issues related to time constraints (Yılmaz Akkuş & Çirkinoğlu Şekercioğlu, 2019). To overcome time-related obstacles, it is vital to consider that teachers should have ready-to-use drama activities prior to instruction and the number of drama studies in science subjects should be boosted to facilitate teachers' practicality with the issue by encouraging them to make drama use more widespread. Therefore, this research makes a valuable contribution to the literature on the grounds that it designs drama activities in electrostatics topic and that these activities are used as a way to determine the effect of drama on student achievement levels of electrostatic concepts.

The main purpose of this research is to determine in what ways and how drama-assisted teaching affects education faculty students' electrostatics concept test levels and their attitudes towards drama method. For this purpose, the sub-problems of the research are shown below;

i. Is there a significant difference between Electrostatics Concept Test pre-test scores of experimental and control groups in terms of group variable?
ii. Is there a significant difference between experimental group's Electrostatics Concept Test pre-test and post-test scores in favour of the post-test?
iii. Is there a significant difference between control group's Electrostatics Concept Test pre-test and post-test scores in favour of the post-test?
iv. Is there a significant difference between Electrostatics Concept Test post-test scores of experimental and control groups in terms of group variable?
v. What are the attitudes of experimental group towards drama method?
vi. Is there any correlation between Electrostatics Concept Test and Drama Method Attitude Survey regarding the experimental group's post-test scores?

Method

Research Design

This study follows a quasi-experimental research design, making use of pre-test post-test control group model. Considering the use of data collection tools, both quantitative and qualitative interpretations are benefitted from.

Participants

The participants of the study were 83 second year students who studied at an Education Faculty, in the west of Turkey.

Table 2 Demographics of Groups

	Experimental Group	Control Group
Female	36	35
Male	8	6
Total	42	41

In forming the sample, the principal of accessibility was followed. This type of the sample requires participants and setting formed taking finances, time, and economy of the environment into consideration (Balcı, 2004).

Data Collection

As data collection tools, the research made use of an Electrostatics Concept Test (ECT) and a Drama Method Attitude Scale (DMAS).

Electrostatics Concept Test (ECT)

To determine the impact of drama-assisted teaching on students' achievement levels regarding electrostatics concepts, an ECT consisting of 20 multiple-choice questions was used. The original test developed by Maloney et al. (2001) included 32 questions and covered topics of electrics and magnetism, and was translated and adapted into Turkish by Demirci and Çirkinoğlu (2004). Validity and reliability tests related to 20-item electrostatics version which is the same test used in this study were run by Çirkinoğlu Şekercioğlu (2011). Table 3 below presents the distribution of topics and concepts regarding the question items in Electrostatics Concept Test.

Table 3 Concepts /Topics Covered by ECT

Items Concepts/Topics	Items
Distribution of charge in conductive and non-conductive	1, 2, 11
Coulomb's law of force	3, 4, 5
Electrical force and electrical field superposition	6, 7

Force caused by electrical field	8, 9, 10, 15
Work, electrical potential, field, and force	9, 13, 14, 15
Getting charged by impact and electrical field	11, 12
Gauss Law	16, 17, 18
Capacity, potential difference, electrical field, electrostatic field	19
Capacity, potential difference, electrostatic energy	20

KR 20 reliability coefficients obtained from various study data related to ECT are presented in Table 4.

Table 4 ECT data KR-20 reliability coefficient Works

	Number of Items	KR 20
Maloney et al. (2001)	32	0.75
Demirci and Çirkinoğlu (2004)	32	0.71
Çirkinoğlu Şekercioğlu (2011)	20	0.67
This study	20	0.66

The reliability coefficient obtained from the data of ECT was calculated as 0.66. Table 5 indicates item difficulty indices and item discrimination indices.

Table 5 ECT item analysis values

Item	Difficulty (p_j)	Discrimination (r_{jx})	Item	Difficulty (p_j)	Discrimination (r_{jx})
1	0.83	0.44	11	0.48	0.52
2	0.36	0.60	12	0.28	0.44
3	0.90	0.30	13	0.60	0.44
4	0.86	0.30	14	0.66	0.30
5	0.84	0.35	15	0.34	0.52
6	0.84	0.35	16	0.69	0.44
7	0.66	0.35	17	0.14	0.30
8	0.69	0.48	18	0.62	0.30
9	0.42	0.30	19	0.55	0.39
10	0.78	0.48	20	0.35	0.30
-	-	-	Mean:	0.59	0.39

ECT average difficulty value was calculated as 0.59 while the average discrimination value was 0.39. The obtained values are in the acceptable range (Tezci & Yıldırım, 2007).

Drama Method Attitude Survey (DMAS)

For the purpose of determining the attitudes of students towards drama method, a DMAS was developed. Influenced by Peer Teaching Attitude Survey developed by Authors

(2011), the scale has four dimensions as follows: “Drama in Physics Lesson (FD)”, “Drama in Electrostatics (ESD)”, “Drama and Problem Solving, Abstract-Concrete Thinking Skills (PCD)”, and “Choosing Drama (DTE)”. After a factor analysis was run, 26 items with 5-point Likert scale was diminished into 18 items. After a pilot study on 152 students who were exposed to drama method and a confirmatory factor analysis via LISREL8.8 software, the survey was applied to 42 students and students and the questionnaire was finalized.

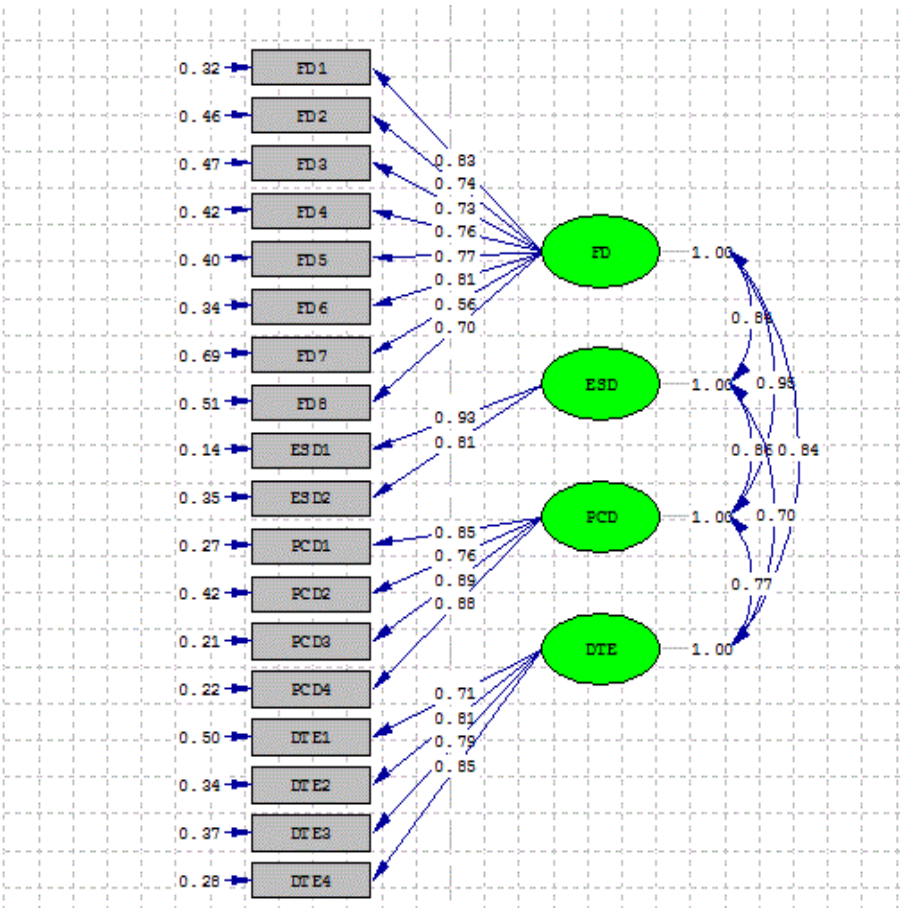

Figure 2 Confirmatory Factor Analysis Values

As shown in Figure 2, considering the distribution of 18 items in accordance with factors and factor loadings, NFI, CFI, and CRMR values were calculated as 0.87, 0.88, and 0.08 respectively. In addition, generated RMS value of 0.19 was outside the desired range. It was assumed that it was due to the small number of items and the participants. Finally, Cronbach’s Alpha reliability co-efficient was calculated as 0.95.

Instruction Process

Both unassigned groups were administered an ECT as pre-test prior to the instruction. It was determined that there was no significant difference between two groups, and the group with the most appropriate timetable was assigned as the experimental group. In the experimental group, drama activities were performed following the regular lesson activities as presented to traditional classroom. For the control group, traditional instruction activities used such as lecturing and question-answer. After the 4-week-long instruction period, both groups were administered the same concept test as post-test. Moreover, the experimental group was administered the DMAS.

Drama Activities Related to Electrostatics

Initially, drama activities concerning electrostatics topic in university were designed by the researcher. After the confirmation of a scholar in the field, these activities were piloted in a group with similar characteristics to the experimental group. After the pilot activities, necessary revisions and developments were made to be implemented to the ultimate context. Activities are listed as follows: electrification by friction, touching, and force; grounding; electrical force and Coulomb Law, electrical field lines, movement of a charged particle in a laminar and a turbulent electrical field and Gauss Law; electrical potential; energy and capacitors.

Table 6 Drama Activities Related to Electrostatics

No	Topic	Drama Techniques	Duration
1	Conductive and insulative	Role playing, improvisation, and still image	45 min
2	Types of electrification and grounding	Role playing, improvisation	45 min
3	Electrical force and Coulomb Law	Role playing, improvisation	45 min
4	Electrical field and lines	Role playing, improvisation	45 min
5	Particle movement in uniform electrical field	Role playing, improvisation	45 min
6	Gauss Law	Acrostics, hot seat	45 min
7	Electrical potential and energy	Role playing, improvisation	45 min
8	Capacity	Role playing, improvisation	45 min

Below is the an example from the drama activities used in teaching:

ACTIVITY 1
Topic: Gauss's Law
Objective: Students discover the features of Gauss's Law and solve the problems presented by using Gauss's Law.
Grade: University 2nd grade
Materials: Pen and paper

Duration: Two lesson hours
Drama Techniques: Writing in a role, acrostics, and hot seats.

1st phase:
In this phase, the lesson knowledge about the basic principles of Gauss's Law is presented to students through direct instruction technique.

2nd phase: Drama Activities

2.1. Preparation - Warm-up:
Since drama activities are to be performed in the classroom environment, the game of stand-up/sit-down is played.

2.2. Enactment:

1st step: Pens and papers are handed out to students. Then, students are asked to write GAUSS'S LAW from top to bottom to create a poem involving the features of Gauss's Law starting with the corresponding letter on each line. Following the completion of the poems, each student reads aloud the product in turn.

2nd step: Features of Gauss's Law are repeated by using hot seats techniques. To do this, four volunteers from the student group are each seated in a chair in turn. The student who is seated is addressed as Gauss's Law. Other students ask questions about the features of Gauss's Law and the circumstances under which it is used. The student in the seat who enacts Gauss's Law answers these questions. Then, other students in turn start enacting Gauss's Law.

2.3. Evaluation:
During this phase, students are asked questions concerning the basic principles of Gauss's Law. Following this, they are asked to write down the general formulae of Gauss's Law, and they are asked to explain how they would solve a problem regarding electrostatics by using Gauss's Law. Finally, sample problems about Gauss's Law are solved to revise what has been learned.

Findings

To determine if the variables were distributed normally, Skewness and Kurtosis normality test was run, and values calculated by dividing Skewness and Kurtosis values were divided by Skewness and Kurtosis error values. As a result, the values were calculated in the range of -1.96 and +1.96; thus, it indicated a normal distribution (Can, 2014).

Table 7 Normal Distribution Values of Data

	Pre Test Scores		Post Test Score		Drama Attitude Score
	Exp.	Control	Exp.	Control	Exp.
N	42	41	42	41	42
Mean	6.21	6.32	13.64	10.07	78.94
Median	6.00	6.00	13.50	10.00	75.77

Mode	6	6	12	9	93
Std.Dev.	2.066	2.055	2.748	2.696	11.972
Skewness	.203	.094	.008	.393	.171
Std. Skewness Error	.365	.369	.365	.369	.365
Kurtosis	-.915	-.880	-1.110	-.394	-.408
Std. Kurtosis Error	.717	.724	.717	.724	.717

Following the determination of data distributed normally, it was decided that parametric test should be used in data analysis.

Findings Concerning First Research Question

Regarding the first research question, an independent sample t-test and Levene test were run to determine a significant difference between two groups' ECT pre-test scores in terms of group variables.

Table 8 Levene and Independent Samples t-test Findings of Pre-test Mean Scores of Groups

						Levene Test		T test	
	Group	N	M	%	S	F	p	t	p
Pre-test	Experimental	42	6.21	31.05	2.066	0.004	0.951	-0.227	.821
	Control	41	6.32	31.60	2.055				

When the experimental and control groups' ECT pre-test scores were examined, it was deduced that both groups mean scores were close in the sense of values, yet no significant difference between them was detected [t81=-0.227, p>0.05].

Findings Concerning Second Research Question

Regarding the research question, a significant difference between ECT pre-test and post-test scores of the experimental group was sought and a paired samples t-test was run.

Table 9 Paired Samples t-test Results of Experimental Group Pre-test Post-test Scores

	N	M	S	sd	t	p
Pre-test	42	6.21	2.066	41	-16.151	.000
Post-test	42	13.64	2.748			

According to t-test findings, a significant difference between the experimental group's pre-test and post-test scores [t41=-16.151, p>0.05]. It was indicated that drama-assisted instruction positively affected student conceptual understanding.

Findings Concerning Third Research Question

For the research question, the control group's ECT pre-test and post-test scores were compared to detect a significant difference, and a paired samples t-test was run.

Table 10 Paired Samples t-test Findings for Control Group Pre-test Post-test Scores

	N	M	S	sd	t	p
Pre-test	41	6.32	2.055	40	-9.334	.000
Post-test	41	10.07	2.696			

Findings of the t-test revealed that there was a significant difference between control group's pre-test and post-test scores [t40=-9.334, p>0.05]. It was found that traditional instruction had a positive impact on students' conceptual understandings.

Findings Concerning Fourth Research Question

An independent samples t-test and Levene test were run to determine if there was a significant difference between ECT post-test scores of control and experimental groups in terms of group variables.

Table 11 Control and Experimental Groups' Post-test Mean Scores and Findings of Levene and Independent Samples t-test

						Levene Test		T test	
	Group	N	M	%	S	F	p	t	P
Post-test	Experimental	42	13.64	68.20	2.748	0.307	.581	5.972	.000
	Control	41	10.07	50.35	2.696				

Considering ECT post-test scores of both group students, mean scores of the experimental group participants were observed to be higher than the control group, and there was a significant difference between them [t81=5.972, p<0.05]. In the study, it was revealed that drama-assisted instruction was more effective than traditional instruction to teach electrostatics in terms of student conceptual understanding.

Findings Concerning Fifth Research Question

Data analysis with regard to the fifth research question was performed to determine if the attitudes of the experimental group towards drama method were positive or negative. It

was revealed that the experimental group mean scores were 78.9% positive based on DMAS administered after the instruction.

Table 12 Means and Percentages of DMAS Items

Item Number	Item	M	%	Std. Dev.
1 (FD1)	Drama is a suitable method for physics class.	4.07	81.4	.712
3 (FD2)	I prefer learning physics through drama more than other methods.	3.90	78	.878
5 (FD3)	Drama simplifies physics subjects.	4.05	81	.764
6 (FD4)	Drama makes physics class more tedious.	4.24	84.8	.576
7 (FD5)	Using drama in physics class is hard and complicated.	3.81	76.2	.943
9 (FD6)	Drama helped me prepare for physics exams.	3.67	73.4	1.028
11 (FD7)	Using drama in physics class is unnecessary.	3.90	78	.692
14 (FD8)	Drama improved my observation and explanation skills in physics class.	3.93	78.6	.778
2 (ESD1)	Drama is a suitable method for electrostatics topic.	3.95	79	.731
15 (ESD2)	Learning electrostatics through drama is enjoyable.	4.07	81.4	.712
8 (PCD1)	Drama improved my logical thinking skill.	3.98	79.6	.715
10 (PCD2)	Drama improved my ability of tangible thinking.	3.98	79.6	.563
12 (PCD3)	Drama improved my ability of abstract thinking.	3.76	75.2	.850
13 (PCD4)	Drama helped me solve problems and devise new approaches.	3.79	75.8	.898
4 (DTE1)	I want to use drama in other classes, as well.	3.93	78.6	.997
16 (DTE2)	Drama is a more modern method compared to traditional instruction.	4.10	82	.726
17 (DTE3)	Teaching through drama should be more widespread.	4.07	81.4	.867
18 (DTE4)	I prefer traditional instruction to learning through drama.	3.86	77.2	.952
	Total	3.95	78.9	11.972

Note. "Drama in Physics Lesson (FD)", "Drama in Electrostatics (ESD)", "Drama and Problem Solving, Abstract-Concrete Thinking Skills (PCD)", and "Choosing Drama (DTE)".

In Table 12 where each item and corresponding values are presented, the data were entered in a way that negative items were coded reversely. When Table 12 is examined, 84.8% of the students thought the drama method eliminated the dull nature of physics lesson while 82% regarded drama method as more modern compared to traditional instruction. Similarly, 81.4% of the participants responded that it is a suitable method for physics lessons, and electrostatics with the help of drama is so fun that it should be made more common. Finally, 81% thought that the drama method simplifies physics subjects.

In addition, when Table 12 is examined, the lowest attitude score of 73.4% is related to the issue of whether drama helps prepare for physics exams. In general, it is evident that each item has a score above 70%, which indicates positive attitudes.

Findings Concerning Sixth Research Question

The data regarding the results of a Pearson Correlation test run to determine if there was a correlation between ECT post-test scores and DMAS post-test scores of the experimental group are presented in Table 13.

Table 13 Experimental Group Post-test DMAS Scores Pearson Correlation Test

		Drama Percentage	Pre-test Score
Drama Percentage	Pearson Correlation	1	.718**
	Sig. (2-tailed)	-	.000
	N	42	42

In accordance with the values in Table 13, there was a significant correlation between ECT and DMAS post-test scores of the experimental group participants. Therefore, it was indicated that students with high attitude scores towards drama method had high concept test levels related to the topic.

Conclusions, Discussion and Suggestions

In the research in which pre-test post-test control group quasi-experimental research model was used, the way drama-assisted instruction as a supplement to traditional setting affected achievement in electrostatics concepts and attitudes towards the drama method was investigated. Both groups were compared to determine if there was a significant difference between their pre-test scores of ECT, and it was revealed that there was no significant difference between the two groups. However, both groups' pre-test scores were quite close in terms of mean scores. On a related note, for the experimental group, a drama-assisted instruction was employed whereas the control group merely followed a traditional instruction. Following the instruction, both groups were compared in terms of their scores based on ECT administered as a post-test, and some conclusions were reached as discussed below:

The experimental group was examined in terms of significant differences regarding the comparison of their ECT pre-test and post-test scores. According to findings of the t-test, there was a significant difference between the pre-test and post-test scores of the experimental group. Therefore, it can be deduced that drama-assisted instruction raises student concept test

levels in teaching electrostatics. This result is aligned with the findings reached in the majority of drama related studies in the literature. For instance, Sağırlı and Gürdal (2002) detected a difference between pre-test and post-test scores in their research in which electrostatics subject was taught through drama. Similarly, Başkan (2006) emphasized the difference between test scores (Başkan, 2006; Sağırlı & Gürdal, 2002).

A comparison of ECT pre-test and post-test scores of the control group was made to determine if there was a significant difference. The findings based on the t-test suggested a significant difference between pre-test and post-test scores of the group [$t40=-9.334$, $p>0.05$]. In accordance with this result, it can be concluded that traditional instruction, similar to the drama-assisted, helps increase the student conceptual understanding levels in the sense of electrostatics. Although teaching methods that harbour active learning techniques have a bigger impact on student concept test levels, it can be thought that traditional instruction methods also affect concept test levels to a considerable extent.

Even though success rates were observed to have increased in both experimental and control groups, ECT post-test scores of the groups were compared and interpreted to decide which group was more successful. Accordingly, when ECT post-test scores of both groups were examined, the comparison revealed that students in the experimental group had higher mean scores than the ones in the control group, thus generating a significant difference [$t81=5.972$, $p<0.05$]. It was revealed that in teaching electrostatics, drama-assisted instruction was more effective in terms of student conceptual understanding levels compared to traditional instruction. Even though the literature did not provide similar research that focused on teaching electrostatics through drama instruction, results of studies including teaching both electricity and other physics subjects indicated that the use of drama increases student achievement levels significantly. For instance, in their research on teaching electricity units to secondary school students through drama, Sağırlı and Gürdal (2002) observed that drama instruction raised student achievement. Moreover, studies that focused on the effect of drama instruction on university level students generated similar findings. Özdemir and Üstündağ (2007) explored in their research conducted on scientists at the university level that drama instruction escalated student achievement levels. In addition, Şahin and Yağbasan (2011) revealed that the use of drama instruction increased student success in physics lab lessons.

Furthermore, whether the experimental group students had positive or negative attitudes towards the drama method were investigated, and DMAS administered following the instruction revealed a percentage of 78.9 in total mean scores. 84.8% of students who received

a drama-assisted instruction stated that the drama method eliminates boring elements in physics class. In addition, 82% thought drama method is more modern than traditional methods whereas 81.4% regarded drama as a suitable tool for physics, suggesting it is so enjoyable that it must be more widespread. Finally, 81% of the participants stated that drama method simplifies physics subjects. As a final note, the research investigated if there was a significant correlation between ECT post-test scores and DMAS scores of the experimental group. Related to this, results indicated that experimental group's ECT and DMAS scores were significantly correlated. Additionally, students with the higher scores for attitudes towards drama method were also more successful with regards to the topic. Among the research in university level, it was pinpointed that students' attitudes towards the drama was generally positive. Taşkın and Moğol (2016a) collected student responses related to drama before and after the instruction, and it was reported that students' attitudes towards drama-oriented instruction improved a great deal after the instruction. Majority of students that participated in the studies stated that drama method can be used in physics lessons and that they would want to use it in their future professional lives. Furthermore, they responded that the most crucial benefit of drama method is that it simplifies the process of establishing a connection between physics subjects and daily life. Oğuz and Altun (2013) obtained similar results in their research focusing on university students, and they revealed that students' attitudes towards drama increased, and drama reduced students' shyness levels.

Regarding all the studies on the field, it was indicated that drama increased student achievement levels and it was favored by majority of students on all levels ranging from primary school to university (Bertiz, 2005). However, it should be taken into consideration that drama might have problematic dimensions. As an example, in the study conducted by Arieli (2007), it was stated that drama instruction activities required more time compared to traditional teaching. Additionally, Türkkuşu (2008) asserted that drama is not suitable for all science subjects, requiring careful consideration for choosing subjects, and drama should not be used as the only instructional tool. Moreover, Taşkın and Moğol (2016a) proclaimed in their study that students might face difficulties with preparing a lesson plan and managing the classroom. In the light of all the insight, it is assumed that drama use should be employed in teaching appropriate subjects if not all, and it is important to make it more widespread in control of the proficient teachers that can efficiently use it. Furthermore, to prevent time constraints in lessons, drama activities pre-designed by scholars in the field should be used and their availability levels for teachers should be increased. Therefore, more drama activities related to physics and science subjects should be designed and added to the literature. Such a

favored method with which active involvement of students can be encouraged should be promoted for a more frequent use to eliminate the tedious atmosphere of traditional teaching environments.

As the last word, drama is not a magic wand like Harry Potter's wand by itself, but it is a more successful method than traditional methods. Because the majority of students have positive attitudes toward this method. The biggest problem with this method is the shortage of time. However, this problem can be overcome by pre-prepared activities, the professionalism of the teacher, and the use of the drama method in appropriate subjects. It can be used in the teaching process from primary school to university.

Compliance with Ethical Standards

Disclosure of potential conflicts of interest

No conflict of interest.

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CRediT author statement

The study was single authored and the whole process was carried out by the corresponding author.

Research involving Human Participants and/or Animals

The study involves human participants. Ethics committee permission was obtained from Balıkesir University, Science and Engineering Sciences Ethics Committee.

Drama Sihirli Bir Değnek mi Yoksa Zaman Kaybı mı?

Özet:

Aktif öğrenme yöntemlerinin kullanıldığı derslere katılan öğrencilerin geleneksel öğretim yöntemlerinin kullanıldığı derslere katılan öğrencilere göre konulara daha fazla ilgi gösterdiğini ortaya koyan birçok araştırma yapılmıştır. Bu araştırmada, drama destekli öğretim etkinliklerinin üniversite öğrencilerinin Fizik-2 dersindeki Elektrostatik kavramlarına ilişkin başarılarına etkisini belirlemeyi amaçlanmıştır. Bu amaçla geleneksel öğretime ek olarak drama yöntemiyle desteklenmiş öğretim gerçekleştirilmiştir. Kontrol gruplu yarı deneysel araştırma deseninde yürütülen çalışmanın katılımcılarını Türkiye'nin batısındaki bir Eğitim Fakültesinde öğrenim gören 83 ikinci sınıf öğrencisi oluşturmuştur. Veri toplama araçları olarak Elektrostatik Kavram Testi (EKT) ve Drama Yöntemi Tutum Ölçeği kullanılmıştır. Araştırma sonucunda drama destekli öğretimle desteklenmiş deney grubunun kavram testine ilişkin puanları kontrol grubuna göre anlamlı düzeyde yüksek bulunmuştur. Ayrıca drama yöntemi ile desteklenmiş öğretim yapılan deney grubunun drama tutum puan ortalamasının %78.9 olumlu olduğu bulunmuştur. Araştırma sonuçlarına göre drama tek başına Harry Potter'ın asası gibi sihirli bir değnek olmasa da geleneksel yöntemlere göre daha başarılı bir yöntem olduğu görülmüştür.

Anahtar kelimeler: Kavramsal anlama, drama destekli öğretim, drama tutumu, elektrostatik, üniversite öğrencileri

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