

Cartoon to solve teaching problem on mathematics

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ABSTRACT

The aim of this study is to determine the effect of mathematics teaching with cartoons on the problem solving skills of primary school 2nd grade students based on addition and subtraction. In the research, pretest-posttest control group design of the experimental model was used. In the classroom where the experimental group students were present, cartoon supported education was applied and the current program based teaching method was used in the control group class. The target population of the study consisted of 2nd grade students of all primary schools of the Ministry of National Education of Mersin. The population of the study consisted of 2nd grade students of all primary schools of the Ministry of National Education of Mersin. The study was conducted for 4 weeks in the fall semester of the 2015-2016 academic year. The experimental group consisted of 17 students and the control group consisted of 13 students. In order to determine the validity and reliability of the achievement test used in the study, item analysis was performed with the TAB program. The t-test was used to determine whether there was a significant difference between the pre-test and post-test scores of the groups. As a result of the research, it was observed that the success of the students in the problem solving in addition and subtraction education has increased.

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1. INTRODUCTION

To learn, to understand and to learn mathematics, first of all, to begin to recognize mathematics correctly. Although mathematics is a subject that is not so popular by most students, its approach to mathematics allows it to be loved, understood and valued yet mathematics exists in every moment of our lives. Thanks to an interest in mathematics, the problems encountered in daily life can be overcome, events can be easily understood and the thinking dimension can guide people how to look at life [1].

Mathematics is the most important part of life apart from being a scientific approach. In particular, mathematics is always used in problem solving techniques. The problem word now refers to the difficulties encountered not only in terms of number values, but also in terms of problem Problem. Therefore, mathematical logic is included in all educational processes from primary education [2].

The activities that will be used in mathematics lesson are to prepare students for life; should have learning environments that allow students to solve problems and to develop their logical skills by reasoning [3]. In recent years, significant changes have occurred in the perspective of mathematics education. In this way, mathematics education, not only to know mathematics, can practice with the knowledge, problem-solving aims to bring people to life [4]. Therefore, different methods and techniques used in mathematics education will prepare students for life, and will help them to produce different solutions to the problems they may face during their lives.

Cartoons are visual art products that can appeal to every age group with their expressions of fun, suggest and convey problems in a fun way [5]. In this context, caricatures can lead to an increase in interest in the course, in particular with humor and line elements, curiosity and desire to learn. A well-chosen cartoon will, above all, contribute to the student's mental development and his critical thinking ability [6].

1.1. Cartoon

One of the most important steps taken by civilization on the path of civilization, as well as finding the least fire and wheel, is the line. With the existence of the line, human beings have unlimited power of expression. The line is a tool that people sometimes use to express their fears, enthusiasm, sadness, feelings and thoughts that they cannot express. Human beings are not only what they see, but want to see; this is the way that he wants to live, not that he lives. Over time, color, stain shape and so on, add the line does not lose its charm. Lines, images and caricatures are the main element on the basis of [7].

There are many definitions of caricature made in the literature. The most common definition of caricature is the art of comic humor [8]. In the definition of cartoon, only laughing element is not included. In addition, the element of thought brings itself to the forefront. In this respect, there is a thought or suggestion in every kind of cartoon. Besides, it is not true to describe the drawings as caricatures [9].

Cartoons are visual art products with a fine sense of humor, which makes the attention of all age groups interesting, laughing [5]. As long as the abstract becomes concrete, the human brain becomes permanent [10]. Cartoon is the visualization of the thought thought to be given. In this respect, it can appeal to people of all ages.

Cartoon lines can be expressed as art made using humor. Information, such as newspapers, magazines, television, communication tools, such as advertising or banners that we notice when walking on the road or the packaging of a product that can be seen in the packaging, sometimes making us laugh sometimes, sometimes giving us the opportunity to express ourselves is an art product. Cartoon criticizes, makes you smile, gives information, and makes you think. On the other hand, it is noteworthy that the cartoon has an instructive aspect. In this case, the place of mind [11]. In short, cartoon is an art that can be interpreted from the person's point of view.

There are three items to be found in the cartoon: line item, laugh item, suggestion item. These three items may not always coexist. Some cartoons include a line item with a laugh element, some with a line item with thought. A cartoon has a line element, but other elements may vary by drawing. However, ideal is the caricatures created with a good line and suggestive of laughter [12].

A cartoon that can give thought to the mind of human intelligence and to give a smile when making it think; it is an art that has a special place in the arts, it is drawn on the one hand and it is debated and it requires a lot of work. In a way, it provides a humorous language of human, events and experiences [13].

Cartoon features can be listed as: Cartoon is to make humor with a line; The line has an integrity that can express humor; The line serves to express humor; Humor cannot be expressed by other means than the line; The concern in the line is to give humor as it feels [14].

Cartoon is a type of humor that is used effectively today. Reflects the events of everyday life in a funny language. It allows people to think and criticize while having fun. Therefore, cartoons have more interest among the public than scientific and technical subjects. The information and message contained in the cartoon become more effective and more permanent [15].

2. RESEARCH METHOD

2.1. Research model

In this study, pretest-posttest control group design of the experimental model was used in order to determine the effect of mathematics teaching with cartoons on the problem solving skills of primary school second grade students. In the pretest-posttest control group design, there are two groups, one of which is formed as neutral and one is the control group. Measurements are made before and after experimental study in both groups [16].

Table 1 shows the symbolic model of research. In this study which examines the effect of teaching by using cartoons on traditional teaching, mathematics education enriched with cartoons and traditional mathematics teaching in the current system are compared. This comparison has been tried to be provided by looking at whether there is an effect of education with cartoon on student success.

Table 1. The symbolic model of research

Groups	Pre Test	Practice	Post Test
G _D	O ₁	X	O ₃
G _K	O ₂		O ₄

The abbreviations shown in Table 1 can be explained as: GD is Experimental group; GK is The control group; O1 and O3 are Pre-test and post-test values of the students in the experimental group; pre-test and post-test values of O2 and O4 are Control group; X Indicates the independent variable (Cartoon-supported education) applied to the experimental group.

At the beginning and at the end of the study, academic achievement test was applied to both the experimental group students and the control group students. In the classroom where the experimental group students were present, cartoon supported education was applied and in the control group the current curriculum based teaching method was used.

2.2. Data collection tools

In this study, the achievement test developed by the researchers was used to determine the problem solving skills of the students in the experimental and control groups. In the process of development of the success test used in the research, first of all, the gains related to the sub-area of the addition and subtraction process with the Natural Numbers found in the Number learning area were determined. A question pool was created by using the sample questions in the literature. Questions related to achievements were selected from the textbook, student workbook, sample books and sample questions in the internet environment, and if the appropriate question could not be found, the questions suitable for the gain were developed by the researchers. While creating the questions in the test, attention was paid to the problems that students may face in their daily life by taking into account the students' level and the problem solving skills of the students. Achievement test five class teachers, a mathematics teacher and problem solving on the issue of the undergraduate and graduate levels of an academic who teaches mathematics teaching courses by taking the expert opinion was tried to ensure coverage and appearance validity. 30-question multiple-choice test was prepared by the researchers according to expert opinions. This test was applied to the second grade students of a similar elementary school and analyzed with the TAB Item analysis program, and the non-functional items were extracted and the achievement test was prepared to be composed of 25 items.

After the item analysis of the achievement test with TAB program, the item difficulty and distinctive features were evaluated and the reliability test KR-20 calculated reliability coefficient was .86. According to [17], the reliability coefficient $r = 0.70$ or 0.60 is considered normal. For this reason, the reliability test of the Achievement Test is high.

2.3. Data collection process

This study was conducted in the second term of the 2015-2016 academic year. Before starting the research, the students talked about the cartoons in which they liked and were happy to watch and the ideas of the students were taken. In this respect, cartoon characters used by the students were used in the cartoons used in the research. A total of twenty cartoons based on the addition and subtraction process are mostly portrayed by Pepe, Smurfs, Keloglan and Sponge Bob. Cartoons are illustrated on A4 paper and reproduced and distributed to students during the event. First, both groups were collected and the mathematics achievement pre-test was applied. Then, in the experimental group, the problems related to addition and subtraction was solved by using cartoons in mathematics lessons for 4 weeks. In the control group, mathematical problems involving the addition and subtraction procedures were solved by the classroom teacher. At the end of the 4-week application, the final achievement test was applied to the control and experimental group. The data were analyzed by SPSS program in computer environment.

2.4. Universe and sample

In the study, 2nd grade students of all primary schools affiliated with the Ministry of National Education of Mersin were accepted as the universe. The sample of the study is the second grade students of a primary school in the city of Mut. Depending on the easy sampling method, the participants of the study were selected by choosing the students who were studying in the second grade of the public school in which the researcher was the classroom teacher. The study was conducted for 4 weeks at the beginning of 2015-2016 period. In the research, the experimental group was selected as the class of the teacher who carried out the study and the control group was chosen as the second class in the school. The experimental group consisted of 15 students and the control group consisted of 13 students. The number of male and female students in the classroom is shown in Table 2.

Students of Classrooms	Female	Male
2-A	8	7
2-B	8	5

2.5. Analysis of data

In order to determine the validity and reliability of the success test used in the study, item analysis was performed with the TAB program. According to the item analysis of the achievement test, item difficulty and substance discrimination values were examined. Subtracting the questions whose item distinctiveness index is less than .20 from the test; Questions between .20 and .40 are very good questions that need to be rearranged and questions above .40 [18]. In the light of this information, three questions (16, 20, 27) which were below .20 were taken from the test according to the item analysis results of the achievement test and the test was finalized in the form of 25 questions. The difficulties and discriminant analyzes of the items of the achievement test are given in Table 3.

Table 3. Difficulty and discrimination levels of success test items

Question number	Difficulty Index (pi)	Distinctiveness Index(rj)
1	0.55	0.48
2	0.70	0.65
3	0.42	0.34
4	0.29	0.23
5	0.42	0.35
6	0.51	0.44
7	0.23	0.16
8	0.79	0.76
9	0.70	0.65
10	0.48	0.43
11	0.42	0.35
12	0.52	0.46
13	0.88	0.85
14	0.26	0.18
15	0.68	0.63
16	-0.18	-0.25
17	0.52	0.47
18	0.53	0.46
19	8.83	0.80
20	-0.33	-0.36
21	0.65	0.60
22	0.36	0.28
23	0.89	0.87
24	0.48	0.41
25	0.27	0.22
26	0.25	0.18
27	-0.21	-0.29
28	0.52	0.46

When this table is examined, the values $p < 0.2$ and $p > 0.5$ indicate potentially defective substances. In accordance with this information, the 16, 20 and 27 questions have been removed from the test and the Success Test has been finalized. In addition, the analysis of the pre-test and post-test data was done by using SPSS software. It was investigated whether there was a significant difference between the academic achievement of the experimental and control groups using two different teaching methods. For this purpose, unrelated t-test was used to compare pre-test and post-test scores. In order to determine whether there is a significant difference between the pre-test and post-test scores among the groups; The associated t-test was used.

3. RESULT DISCUSSION

3.1. Is there a significant difference between the mathematics achievement pre-test mean scores of the experimental and control groups?

Unrelated t-Test was used to determine whether there was a significant difference between the pre-test mean scores of mathematics achievement test of both groups. The data obtained are shown in Table 4.

Table 4. Problem solving skills of experiment and control group t-test results on the differences of pre-test scores

Group	N	\bar{X}	s	sd	t	p
Experiment Group	15	17.46	3.719	26	513	613
Control Group	13	16.84	2.444			

In Table 4, the average of achievement test in the experimental group was 17.46 and the average of the achievement test in the control group was 16.84. In order to understand whether there is a significant difference between the mathematics achievement pre-test mean scores of both groups, it is understood that there is no significant difference between the mean scores of mathematics achievement pre-test because of $p > 0.005$. As a result of the findings obtained, it is seen that the experimental and control groups are similar in terms of success.

3.2. Is there a significant difference between the mean scores of achievement test pre-test and post-test in the experimental group?

According to this sub-problem, associated t-Test was used to determine whether there was a significant difference between the experimental group's problem solving ability pre-test and post-test mean scores. The results are shown in Table 5.

Table 5. t-Test results of experimental group differences in problem solving skills

Experimental Group	N	\bar{X}	s	sd	t	p
1.Pre-test	15	17.46	3.719	14	-2.203	.045
2.Post-test	15	20.53	3.700			

In Table 5, the mean pre-test score of the experimental group was 17.46 and the posttest mean score was 20.53. In order to determine whether there was a significant difference between the pre-test and post-test mean scores of the experimental group, the difference between p and 0.05 was significant. As a result of mathematics teaching with cartoons, it is seen that mathematics achievement test averages increased and cartoon mathematics teaching helped students to understand mathematics. The results obtained in this study are consistent with the results of the studies conducted by [19]-[30].

3.3. Is there a significant difference between the mean scores of the pre-test and post-test scores in the control group?

In order to determine whether there was a significant difference between the control group's problem-solving skill pre-test and post-test mean scores, the related t-Test was used to show the relationship between two variables in that group. Analysis of this problem is shown in Table 6.

Table 6. t-Test results of control group's problem solving ability differences

Control Group	N	\bar{X}	s	sd	t	P
1.Pre-test	13	16.84	2.444	12	-.617	.549
2.Post-test	13	17.00	2.677			

The mean pre-test score of the control group was 16.84, and the final test score was 17.00. Even if there is an increase in the post-test mean score, it is seen that the difference between the pre-test and post-test is significant and the difference between p and 0.05 is not significant. Although there was no significant difference between the pre-test and post-test mean scores of the control group, the grade achievement was increased in the post-test average.

4. CONCLUSION

In the light of the findings obtained in this research, the following results were obtained. It is seen that there is a significant difference between the experimental group and the mathematics achievement of the control group which is currently applied by the teaching method. It can be said that teaching with cartoon is more effective than traditional teaching methods. In addition to this, we have observed that cartoon education is a material that is successful in attracting the attention of students increased the student's enjoyment of the course and that they entertain and laugh. With this perspective cartoon can be an effective teaching tool when used in education. Cartoon teaching can be helpful in eliminating the need to be a boring course due to the natural nature of mathematics. In terms of anxiety almost mathematics takes first place for students. Cartoon teaching can also help to reduce anxiety to mathematics and helps to student to develop positive attitude for mathematics.

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