



## TEACHING MULTIPLICATION AND MULTIPLICATION TABLES BY THE APPLICATION OF FINGER MULTIPLICATION

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### Abstract:

Developments in mathematics education tend to emphasize mathematics teaching with the help of activities that will allow the students to create these concepts rather than to make them memorize mathematical rules. The purpose of this study is to analyze the applicability of the application of multiplication with fingers developed by the researcher. In the application, the relation between addition and subtraction is featured in teaching multiple table rather than memorization. Within the scope of this aim, an action study consisting of 3 steps was carried out with 11 the students who were studying on the 2nd grade of a primary school in the Sarıyer district of Istanbul province for the period of 6 course hours. At the end of the application, 7 teacher watched the video recording of the application and were asked for their views on it. Guidelines about how the application was carried out have been sent to the parents of the students in the class. The parents were asked to follow their children throughout the application and to give their opinions about it. The application has been completed with receiving the opinions of researcher, teacher, the parents and the students. It was observed that the students' learning was effective, their motivation and participation were at a high level during the application. The teachers found the application practicable. According to the views of the parents and the students, the application has been described as easily applicable, enjoyable and effective. The application of finger multiplication used in the study can be assessed as an application that will be used in the various stages of the course in order to teach multiplication, provide student motivation towards lesson and obtain other concepts related to multiplication table and multiplication

**Keywords:** teaching multiplication, multiplication table, visualization

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## 1. Introduction

The primary objective in the first stage of elementary education is to prepare individuals for life and the next stage of education. In achieving both, effective reasoning, critical thinking and problem solving are important cognitive skills. Each course in the curriculum of elementary schools plays a role in improving such skills; however, mathematics is the most important of all. Therefore, it is essential that mathematics education in the first stage of elementary education be offered efficiently enough to ensure the improvement of such cognitive skills. Another reason for the necessity of offering an effective mathematics education in the first stage of elementary education is the fact that elementary school years coincide with the period when children develop basic skills while their cognitive development occurs at the highest speed (Baykul, 1999).

Mathematics consists of topics following sequences in itself. Higher-level mathematics depends on understanding mathematical concepts and operations and learning the basic mathematics skills (Kammeenui and Simons, 1999; Lerner, 1997). Four operations have a rather significant role in mathematics topics. Having a good grasp of four operations facilitates learning higher-level mathematics topics. Four operations consist of addition, subtraction, multiplication and division (Haskell, 2000). Four operations follow a hierarchy within themselves. It is said that being successful in subtraction requires being good at addition while multiplication requires a good knowledge of addition and subtraction, and division requires excellence at all of them.

Four operations skills are the prerequisite for developing mathematics skills. Individuals who have difficulty improving their mathematics skills experience such difficulties mostly because of their inadequate knowledge of four operations (Algozzine, O'Shea, Crews and Stoddard, 1987; De Corte and Verschaffel, 1981; McLeod and Armstrong, 1982; Russell and Ginsburg, 1984). A study conducted by Cox (1975) showed that a great majority of the mistakes made by all students resulted from the mistakes in multiplication operations. The ability to use four operations fast and accurately depends on sufficient development of skills in multiplication operation among four operations (Campbell, 1987; Mc Closekey, Harley and Sokol, 1991).

Learning multiplication facts is a key issue in mathematics in primary schools (Gardella, 2009). *"We all know that learning multiplication is an essential part of our child's elementary education. Students who have mastered multiplication gain a solid foundation in Mathematics that will help them throughout middle school, high school and beyond."* (Jarema, 2007).

*“When facing difficulty in memorizing multiplication facts, the student will not be interested and bored to answer questions involving multiplication. Weakness in mastering of multiplication facts is causing them to fail to answer mathematics questions related to basic multiply facts such as questions involving multiplication and division operation. Therefore, the weak in mastering multiplication facts is one of the factors that will lead to low achievement in mathematics. Thus, multiplication facts teaching methods need to be focus in improving student proficiency on the skills. In teaching and learning multiplication facts at the primary school level, rote methods commonly be used (Norasmah & Shuki, 2009). Sousa (2006) explains that memorization exercises are activities that aim to remember and store any information or facts to circumstances but do not understand the concept in of long-term memory such as memorizing multiplication facts. This may cause students to feel quickly tired and less motivated to learn multiplication facts because using too much time to memorize the multiplication facts but do not understand.”*

(Roslan, 2004; Kamaliah, 2006; Zainudin and Mohd. Rashidi, 2007)

(Thai and Yasin, 2016, p. 41)

Teachers must constantly modify and enrich the range of teaching methods to entice students in improving the learning outcomes. Teaching methods need to be more focused on active participation of students, the practice of constructivist methods and attracted the attention of students to teaching and learning becomes more meaningful.

### **1.1 Visualization**

Visualization is counted among the suggestions to overcome the difficulties experienced in mathematics teaching. It is seen that education systems have started to use mathematical visualization more effectively as it is believed to have certain benefits such as relieving the mathematics anxiety and minimizing dependency on formulae.

Mathematics academicians interested in visualization approach have defined visualization in various ways: Zimmermann and Cunningham (1991) define visualization as *“forming geometric or graphic images of concepts, principles and problems in mathematics whether using pencil and paper or with the aid of technology or the process of using such images”*. Schnotz et. al. (1995) defines visualization as *“the process of transforming a visual model into a mental structure”*. Zazkis et. al. (1996) suggests that visualization may be defined as *“the act of forming a strong bond between an inherent concept and what the individual has gained through senses”*. They suggest that such process of visualization may take place as the envisioning of an object or an event that an individual has perceived in the outer world or transferring a structure that the individual envisaged to the physical

world using a cardboard, a blackboard or a computer. Therefore, the act of visualization may be considered as the transformation from outside to inside or the reverse. At the same time, visualization is a connection made by the individual between a figure and his mind (Zazkis et. al., 1996). The key in visualization approach, which is plainly defined as the expression of abstract concepts in concrete structures, is to allow students to perceive the existence of various action systems and various spaces by attracting their attention with reference to geometric concepts and models, develop cognitive independence and productivity of the individual through abstraction habit and ensure meaningful and permanent learning (Konyalioglu, 2003).

It is evident that use of visualization in mathematics education may have a positive effect on students in both cognitive and affective aspects. For this, use of visualization in mathematics education starting from the first stage of elementary school will add a new dimension to mathematics education. Visualization stands as a beneficial approach to attract students' attention, motivate them, concretize learning and make it meaningful and for students to organize their own knowledge and associate concrete and abstract expressions of concepts. Teachers of Mathematics and didactics specialists propose a series of modern and amusing methods for memorizing the multiplication table, methods that are complementary: games, songs, manipulatives, stories, short movies, multiplication tricks etc. (Liataud and Rodrigues, 1999)

Sidekli, Gokbulut and Sayar (2013) suggest that use of visualization in mathematics education may have a positive effect on students in both cognitive and affective aspects. For this, use of visualization in mathematics education starting from the first stage of elementary school will add a new dimension to mathematics education. Visualization stands as a beneficial approach to attract students' attention, motivate them, concretize learning and make it meaningful and for students to organize their own knowledge and associate concrete and abstract expressions of concepts. Therefore, the objective of this study is to eliminate the difficulties experienced by 4<sup>th</sup> grade primary school students in four operations in Mathematics lesson. The research was conducted in a central elementary school within the body of Mugla Provincial Directorate for National Education during spring semester of 2011-2012 academic year. 4<sup>th</sup> grade students participated in the research. As a result of the research, it was observed that calculation mistakes made by students in four operations decreased as of the last assessments and students were more successful at division and multiplication operations.

In their study, Uysal, Kog and Baser (2011) examined the effect of visualization approach on the levels of learned helplessness in mathematics and conceptual skills of students. It was an experimental study based on a preliminary test-final test model with

experimental-control groups. The experimental and control groups included 8<sup>th</sup> grade students from an elementary school in Izmir during 2010-2011 academic year. "Scale of Learned Helplessness in Mathematics" and "Conceptual Thinking in Mathematics Test" developed by the researchers were used as assessment instruments. The results indicated that visualization approach had a positive effect on conceptual thinking skills of students in Mathematics and their learned helplessness.

In their research where the effects of visualization approach used in mathematics education on mathematics teaching are discussed, Isik and Konyalioglu (2005) concluded that use of visualization in mathematics education starting from the first stage of elementary school would add a new dimension to Mathematics education. They concluded that visualization stood as a beneficial approach to attract students' attention, motivate them, concretize learning and make it meaningful and for students to organize their own knowledge and associate concrete and abstract expressions of concepts.

Developments in mathematics education tend to bring forward mathematics teaching through activities that will allow students to form mathematical rules instead of memorizing these concepts (Arcavi, 2003; Olkun, 2004; Orhun, 2007). It is rather difficult for play-age children to memorize and learn abstract concepts. Learning multiplication table is one of these concepts that are difficult to learn. Since multiplication table requires memorization, it is considered among the topics that cause difficulties. One of the challenges faced by the students in the first stages of elementary school is the task of memorizing the multiplication table; however, multiplication table must be taught using various methods instead of making students memorize it. It is an expected outcome that students who are challenged by such a difficult memorization task in the early years of school life develop a negative attitude towards mathematics in later years. Studies conducted support that learning basic rules is based on the idea of developing cognizance strategies (Baroody, 2006; Fuson, 1992; Henry and Brown, 2008). There are mounting evidences on showing an effective and practical strategy to students and implementation of such strategy by the students in the same way it is shown to them (Baroody, 1985; Bleyve Thornton, 1995; Fuson, 1984).

Teaching of such a clear strategy is intended to encourage students to contemplate rather than forcing them to use a strategy they have memorized. Studies conducted related to teaching the multiplication table are the those intended to teach the multiplication table using different strategies and without memorization (Lambert, 1986; Kamii and Anderson, 2003).

Several studies were conducted on children with mental or learning disabilities in relation to teaching the multiplication table using visualization techniques (Mattingly

and Bott, 1990; Koscinski and Gast, 1993; Morton and Flynt, 1997; Cybriwsky and Schuster, 1990), and it was found out that teaching the multiplication table through visualization was an effective and productive method.

The lessons that integrate physical and mental reflection are more effective in learning the multiplication facts as a parable told by Marshark, Lang and Albertini (2002), *“Tell me, and I will forget; show me, and I will remember; involve me and I will understand”*.

It is clear that use of visualization in mathematics education may positively affect students in both cognitive and affective aspects as also supported by the results of the aforementioned studies. Therefore, this research was carried out believing that use of visualization in mathematics education starting from the first stage of elementary school would add a new dimension to mathematics education.

In this research, a special study conducted with students who cannot learn the multiplication table. The study benefit from an activity intended to visualize the multiplication table and ensure comprehension of its relationship with the addition operation.

Our research problem: Is our activity regarding the teaching of the multiplication table by visualization using figures attached to fingers of students intended for their visual memory effective for students, who have difficulty learning the multiplication table, to learn the multiplication table?

Within the frame of this problem, we have sought answers for the following sub-problems:

1. Can it be used in classrooms as an activity?
2. What are the opinions of students, teachers and parents regarding the method?

## **1.2 Objective of the Research**

The objective of this research is to eliminate the difficulties experienced by 2<sup>nd</sup> grade primary school students who do not have any physical or mental problems but have difficulty learning the multiplication table in mathematics course by using the activity to be carried out. This is an important research since it is intended to determine the difficulties experienced by 2 grade primary school students in learning the multiplication table in mathematics course and to eliminate such difficulties.

This study investigates a method in which the students who have difficulties in learning multiplication table can be in the application in person. By teaching the application of finger multiplication applied using visualization to the students, the study also introduces a method that will support a more fun and permanent learning than the mostly used memorization method to the teachers and the students and

investigates its applicability. In mathematics, this method is important in the determination and elimination of difficulties experienced by the students in learning multiplication table in terms of its being an alternative method for the teachers, the students and the parents. The course hours when the finger multiplication was applied were recorded and 7 mathematics teachers whose vocational seniority ranged from 4 to 21 years watched the recordings. By observing the student behaviors during the application, it was decided whether the method was applicable by taking the opinions of the teachers and the parents about the application.

## **2. Method**

This part of the study discusses the model of the research, its study group, data collection instruments, collection and analysis of data.

### **2.1 Research Model**

This research was modeled using the action research of the qualitative research pattern. There were two important reasons for selecting action research as the method of the research. First reason was to ensure detailed analysis of the current situation and determine the causes preventing learning. According to Baker and Logan (2006), action research is a special social process that focuses on an issue or certain practices. The second reason was to ensure observation of the effects of the most suitable method and techniques in order to eliminate the existing problems. According to Rawlinson and Little (2004), action research is a professional development model related to a process that continuously enables educators to develop teaching researches and students to learn and improve their learning.

### **2.2 Study Group**

This research uses “criterion sampling” method from among the methods of sampling intended for qualitative researches to form the study group. According to Yildirim and Simsek (2005), the key understanding in criterion sampling method is the study of all situations that correspond to a series of predetermined criteria. The criterion or criteria mentioned here may be created by the researcher, or a list of criteria prepared beforehand may be utilized.

When forming the study group, the criteria sought was: students to be primary school students. The students in the study group were selected from two schools within the body of Istanbul Provincial Directorate for National Education during Spring Semester of 2015-2016 Academic Year.

A total of 11 students participated in the application. 7 the teachers who had been working in the province of Istanbul for 4 to 21 years were consulted on the functionality of the application. In addition, 11 the parents were asked about their opinions on the practicability of the application at home and their observations about their children during the process.

### 2.3 Study Environment and Process

In order to conduct a reliable study with the students, a study environment suitable for the objective and process of the research was prepared.

The research lasted for 3 days. During this period, the study was conducted with students for approximately 6 hours.

The study consisted of 3 key stages:

**Stage 1:** During the Stage 1, students were studied to see which strategies they used when performing the multiplication operation, what kind of problems they experienced when learning the multiplication table and why they experienced such problems.

Accordingly, students were given problems about multiplication operations, and they were recorded on video when solving the problems to observe and determine which strategies they implemented.

The students were given rhythmic counting exercises, and after these exercises, it was concluded that the preliminary knowledge of the children was sufficient and their academic successes were above average. At the next stage, the students were asked whether they knew how to multiple. It has been observed that the students began to learn the multiplication table lately and recognized the multiplication symbol (x).

**Stage 2:** In order to allow the students to understand that the logic of multiplication originated from the addition operation, they were asked problems that would require them to make multiplication operation and studies were conducted with them on how they could solve the problems using the addition operation.

The activity was held for 2 hours. In the first course hour, the students were given addition and rhythmic counting exercises in the general terms and in the second course hour, multiplication and application were introduced. Before describing the multiplication process, the students were shown the stickers to be used when multiplying. Significant increases were observed in the motivation of the students when they were told that they would be doing a different application with these stickers.

It was started with easy addition examples. The students were able to easily respond to questions of  $7 + 3 = 10$ ,  $5 + 2 = 7$ ,  $5 + 5 = 10$ , and then were asked such problems as the following.

Example question 1: *“There are 4 rabbits in a farm. What’s the total number of rabbits’ feet in the farm?”*

Example question 2: *“There are 3 chicks in a farm. What’s the number of the chicks’ feet in the farm?”*

The students have easily found the answers of these questions and similar problems by doing operation of addition as  $4 + 4 + 4 + 4 = 16$  and  $2 + 2 + 2 = 6$ . The students were informed that the multiplication was shortened the operation of addition and the examples which were initially given were turned into the operation of multiplication. These examples have been replicated and applied.

During the application, it was stipulated that the number of stickers on one finger should be the same as the number of stickers on other fingers. Thus, the students could estimate how many stickers they had in total, even if the other fingers were closed.

The teacher attached the colored and figured stickers of the number that would be used for the multiplication operation on his/her fingers. He/she opened his/her fingers one by one and asked the students to add the numbers of the figures on his/her fingers... He/she got the answers.

He/she asked the students to determine how many figures there were on his/her closed fingers and opened his/her fingers one by one as the students gave answers. In the next step, he/she showed the students different figures and asked them to select the figure; and then, the teacher and students carried out the same stage together.

Later on, the teacher turned the back of his/her hand, asked the students to identify the remaining figure numbers in his/her hand with the finger numbers and referred to the multiplication table.

The teacher repeated these steps for all the positions of the relevant number in the multiplication table. For example,  $3 \times 1$ ,  $3 \times 2$ ,  $3 \times 3$ , ...,  $3 \times 10$ ...

Given the opportunity, the students were also asked to show the operation of multiplication using stickers.

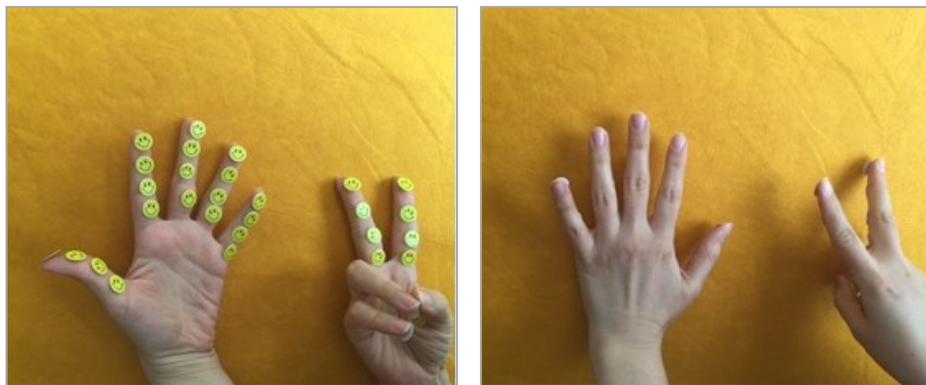
Classroom activities were carried out regarding this method. These activities were diversified and increased depending on the progress of the students. Students were given stickers as gifts and asked to practice similarly at home with their parents.

**Stage 3:** The students were asked to solve the problems asked to them at the beginning using this method. The sticky figures attached on the fingers were removed, and the students were asked to guess the numbers given as before.

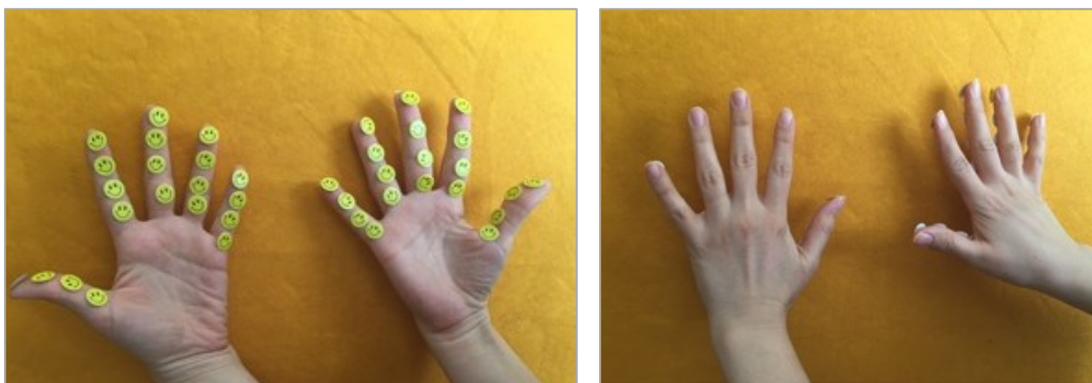
The students were asked to produce similar problems and solve the problems they produced for each other using the same modelling method.



**Figure 1:** Display of  $3 \times 4$



**Figure 2:** Display of  $4 \times 7$



**Figure 3:** Display of  $4 \times 10$



**Picture 1:** Views from the application

At the end of the study, the students were asked to answer the some questions to get their opinions on the activity. Videos recorded during the studies were screened for teachers, and they were asked to answer the following questions to get their opinions on the activity.

Videos recorded were not shown to parents. A directive has been prepared to explain the implementation, so the way the implement is described. They were illuminated on the implementation of the activity and asked to answer the some questions to share their observations based on the homework assignments given to students regarding the activity and the attitudes of their children toward the activity.

### **3. Findings**

Findings of the study were analyzed under two separate headings. In the first part, observations about the 3 steps conducted in the application were given. In the second part, student and parent interview forms were analyzed. In order to determine the distribution of the students' opinions on the application, frequency (f) and percentages (%) related to the responses to each of the 5 questions asked to the students and the 4 questions asked to the parents were tabled and the necessary evaluations were made. In addition, the opinions expressed in the evaluation texts of the teachers' views were included.

#### **3.1 Findings based on the observations during the application**

The students were observed that they voluntarily participated in the application by wondering about it, carefully listened to the researcher, and had a lot of fun. They were also not bored during the application.

In the first phase of the practice, it was observed that the questions in the transition stage from addition to multiplication were answered correctly by all the students. The students were not able to answer the questions asked by heart about the multiplication table with the same success, and had difficulties in memorizing the multiplication table. At the time of application, the students were trying to learn the multiplication tables of 2 times and 3 times tables. On the paper, while giving the answer of the question of " $3 \times 2 = ?$ ", it was observed that those who gave the answer of " $3 + 2 = 5$ " fell into the concept error.

As a result of the observations, it was found out that most of the mistakes made by the students resulted from getting confused about the multiplication table, which they tried to memorize.

A few of the students realized that the multiplication had a commutative property. After sticking the stickers on their fingers and unraveling the questions, the students were observed that they were able to grasp the logic of the application without using stickers. In the third phase of the practice, it was observed that they asked questions that forced each other. Throughout the course, it was observed that the motivations of the students were high and they attended the classes in full.

### **3.1.1 Findings about teacher, parent and student opinions**

In this section, the answers of the teachers, the students and the parents were evaluated at the end of the practice in order to find an answer to the research question. After this presentation, 4 questions reflecting the teachers' views, 5 questions reflecting the students' opinions, and 4 questions reflecting the parents' opinions were asked.

The views of the teachers on the application were determined by the four questions asked about the application. The percentage results of the opinions taken from the students and the parents were included.

#### **3.1.1. a. Findings from the questions directed to the teachers about the application**

*"Do you think your students have liked this method?"* All of the teachers stated that the students liked the activity. It has been indicated by the teachers that the practice was remarkable and that providing the participation of all pupils was important in the students' enjoying the application. It was emphasized that the simplicity and visualization of the practice enhanced the participation.

The classroom teacher of the class where the application was applied, Ö1 shared his observations that the twin siblings who had difficulty understanding and were having special education generally did not participate anything in the class, but wanted to participate in this activity. He stated that the reason of their participation might have been the fact that these students perceived this application as a game and were given gift stickers at the end of the application.

*"Do you think this method has been fruitful in the effective learning of the students?"* All of the teachers answered "yes" to this question. They pointed out that the teaching of multiplication table with presenting addition and multiplication together and visualization of them were effective.

Are there any aspects of the activity you like or believe that can be improved? The teachers' responses to this question showed that they liked the application in general terms. T3: *"I think that the students love it. However, I wonder if the students' constantly doing finger calculations would prevent them from doing the calculations in their*

*minds in the future. For example, when we ask them what six times nine is, they can answer it by heart immediately. However, the habit in this application may slow their calculation speed”.*

T1: *“In this application, I have observed that the students were more excited about the part of showing practical questions and answers, when they were asked to solve the questions at the end of the activity. However, I have observed that they were very slow when doing the exercises. I think the application should be applied for a long time to reinforce it”.*

T5: *“My favourite part of the application is that the students’ applying it by themselves and its contribution to their visualities. Too much noise in the class and the students’ mobilities can be a problem in the long run”.*

*“Would you also consider using this activity?” All of the teachers mentioned that they could use this application.*

T4: *“I was trying to teach the relationship between addition and multiplication by the questions I asked, but I have never used such a model. I saw that the students were willing to participate, and the stickers that they loved made it effective. I’m thinking of using this practice. However, I think it is necessary to practice too much, and it will be more effective if the parents participate in the practice and to support the students at home, as well”.*

### 3.1.1. b. Findings from the questions directed to the parents on the application

**Table 1:** Distribution of the replies to the question:

*“Are there any aspects of the activity you like or believe that can be improved?”*

	I liked it		Undecided		I didn’t like	
	(f)	(%)	(f)	(%)	(f)	(%)
Are there any aspects of the activity you like or believe that can be improved?	8	72,72	1	9,09	2	18,18

As it can be seen in Table 1, to the question about whether the activity was appreciated; 72,72% of the parents answered “yes”, 18,18% of them said “no” and 9,09% of the parents said “undecided”. The parents also stated that they thought that the students learned the subjects taught by visuals faster. As it is understood from the parents’ comments, we can say that the parents liked the activity.

**Table 2:** Distribution of the replies to the question:

*“Do you think this is a method you can easily implement when you help your children study at home?”*

	<b>Yes</b>		<b>No</b>	
	(f)	(%)	(f)	(%)
Do you think this is a method you can easily implement when you help your children study at home?	8	72,72	3	27,27

As you can see in Table 2, to the question of *“Do you think that it is a method that you can easily apply while you are helping your children at home?”*, 72.72% of the parents answered "yes" and 27.27% of them answered "no".

While the parents found this method generally applicable, some of the parents of state-school children stated that they could not do the activity.

**Table 3:** Distribution of the replies to the question:

*“Do you believe the activity has been effective?”*

	<b>Yes</b>		<b>Undecided</b>		<b>No</b>	
	(f)	(%)	(f)	(%)	(f)	(%)
Do you believe the activity has been effective?	10	90,90	1	9,09	0	0

As can be seen in Table 3, to the question of *“Do you think the activity worked?”*; 90,90% of the parents answered “yes” and 9,09% of them said “undecided”.

The vast majority of the parents said that the activity was effective. It can be reached a result that the practice is useful in learning multiplication table. The undecided parent said that it was too early to comment.

**Table 4:** Distribution of the replies to the question:

*“Do you think the activity has caused any changes in how your child feels about mathematics?”*

	<b>Yes</b>		<b>Not Least</b>		<b>No</b>	
	(f)	(%)	(f)	(%)	(f)	(%)
Do you think the activity has caused any changes in how your child feels about mathematics?	7	63,63	2	18,18	2	18,18

As it is seen in Table 4, to the question of “*Did the activity cause any changes in your child’s attitude towards math?*”, 63.63% of the parents answered “yes”, 18.18% of them said “a little” and 18.18% of the parents responded “no”.

Some of the parents said that their children voluntarily did the activity and developed positive attitudes towards mathematics with it. There was a significant difference between disadvantageous and advantageous regions. This activity can be said from the opinions of the parents that the disadvantageous the students were interested in the activity because mathematics was taught with a different teaching style and it changed their attitudes.

### 3.1.1. c. Findings from the questions directed to the students about the application

**Table 5:** Distribution of the replies to the question:  
*“Did you like the activity?”*

	I liked it		Not Least		I didn’t like	
	(f)	(%)	(f)	(%)	(f)	(%)
Did you like the activity?	9	81,81	1	9,09	1	9,09

As you can see in Table 5, to the question of “*Did you like the activity?*”, 81,81% of the the students responded “yes”, 9,09% of them said “a little”, and 9,09% of them answered “no”.

According to the table, the majority of the students liked the activity. It was observed that the students were entertained during the narration, because the students were told mathematics with visual materials.

**Table 6:** Distribution of the replies to the question: “*Were there any parts you had difficulty when doing the activity? If yes, which parts did you find difficult?*”

	Yes		Not Least		No	
	(f)	(%)	(f)	(%)	(f)	(%)
Were there any parts you had difficulty when doing the activity? If yes, which parts did you find difficult?	3	27,27	2	18,18	6	54,54

As you can see in Table 6, to the question of “*Did you have any difficulties while doing the activity?*”, 27.27% of the students answered “yes”, while 18.18% of them said “a little”, and 54.54% of them responded “no”.

It can be considered that the students had difficulties since they had met the operation of multiplication for the first time. Some concept errors were seen in the students. They also confused the operation of multiplication with the operation of addition. The ones who had no difficulties has adapted more easily to the operation of multiplication, since they had known rhythmic counting before. The students’ learning the operation of multiplication by seeing through stickers attached to their hands may have made easier for them to learn the operation of multiplication. The students provided immediate feedback, when they got stuck.

**Table 7:** Distribution of the replies to the question: “*Did this activity caused any changes in how you feel about mathematics?*”

	Yes		No	
	(f)	(%)	(f)	(%)
Did this activity caused any changes in how you feel about mathematics?	7	63,63	4	36,36

As seen in Table 7, to the question of “*Did this activity cause any changes in your perspective towards mathematics?*”, 63.63% of the students answered “yes”, and 36.36% of them said “no”.

In the vast majority of the students, it was seen that they developed a positive attitude towards mathematics. Given the disadvantageous and advantageous regions, the most attitudinal changes towards mathematics is in the disadvantageous area. The opportunities that the students had were more limited than the advantageous area. Enriching the teaching environment in this way has allowed more positive responses from the students.

**Table 8:** Distribution of the replies to the question: “*Have you ever practiced a similar method before?*”

	Yes		No	
	(f)	(%)	(f)	(%)
Have you ever practiced a similar method before?	1	9,09	6	90,90

As you can see in Table 8, to the question of “*Have you ever attended in this kind of activity before?*” 9,09% of the students answered “yes”, while 90,90% of the students answered “no”. It can be said that the students did not study about visualization in mathematics. Because math is an abstract subject. The teachers may have difficulty finding materials.

**Table 9:** Distribution of the replies to the question:  
“*What did this activity give you in terms of mathematics?*”

	Yes		No	
	(f)	(%)	(f)	(%)
What did this activity give you in terms of mathematics?	9	81,81	2	18,18

As it can be seen in Table 9, to the question of “*Did this activity give you a different mathematical perspective?*” 81.81% of the students responded “yes”, while 18.18% of them said “no”.

It can be understood from the student feedbacks that the activity provided practicability to the students in rhythmic counting, transition of multiplication and addition, operation of multiplication and multiplication. The students were able to do multiplication by using the stickers sticking to their fingers and then by imagining without stickers. In this way, the students have seen that multiplying is the shortest way of addition. The activity facilitated the operation of multiplication not by memorizing but by grasping its logic. As the students use this method, they will become practical and it will be easier for them to learn the multiplication and multiplication table.

#### 4. Discussion and Suggestions

As a result of the preliminary assessment, it was observed that students failed to give correct answers to many of the problems of multiplication operations. This was believed to have resulted from the difficulties experienced by the students in addition operations and the fact that they did not understand that multiplication operation was a shortcut for addition operation. The application of multiplication with fingers were used and activities were conducted with the students using such methods in order to eliminate the difficulties experienced by the students in multiplication operation and minimize their chances of making mistakes. As a result of the classroom activities, improvement was observed in the multiplication skills of the students. According to

this result, the application of multiplication with fingers increased the motivation of students in multiplication operation.

National and international studies carried out suggest that use of modelling methods in mathematical operations allow students to concretize problems and increase their skills at four operations (Keskin, 2008; Barwise and Etchemendy, 1991; Lesh and Doerr, 2003).

In the applications in which the students participated and learned by experiencing, the findings indicated that the students' learning was effective and their motivations were high. Similar results were obtained in other studies in the literature. (Olkun and Uçar, 2003, Dursun and Dede, 2004; Temizoz and Koca, 2010)

In the study, the teachers were seen to have agreed that the practice was incentive and an application towards understanding rather than memorizing. These views of the teachers generally overlapped with the studies (Greer, 1997; Schonfeld, 1992) that indicated that verbal skills were not sufficient in teaching mathematics and that various models should be used.

Despite the fact that the vast majority of the teachers participating in the study did not use alternative teaching approaches, having a positive conception about these approaches was parallel to the research findings presented by Watt (2005).

However, it has been seen that some of the teachers emphasized the necessity of knowing the multiplication table by heart. In this context, it has been seen that the teachers could not give up the memorization approach in the different studies conducted for the teachers and prospective the teachers. These results of the study are in parallel with the results of various researches focusing on the knowledge of operation teaching and the instructional explanations of prospective the teachers in the literature. (Baki, 2013, Ball, Thames and Phelps, 2008; Charalambous, 2010; Toluk - Uçar, 2011)

As a result of the study, it was observed that using the application of multiplication with fingers when teaching the multiplication with natural numbers allowed students to concretize operations and minimize their mistakes.

When teaching the multiplication of great importance as the foundation of mathematics, use of visual methods will be useful in allowing students to improve their operation skills and solve four operation problems without having difficulty. The students have rediscovered their knowledge of multiplication in realistic learning environments and in the guidance of a teacher using appropriate models and shared their own thoughts and results with the class. Thus, the multiplication and multiplication table are not a complete set of information presented available for the students, any longer.

It is suggested that our teachers should be given further information about the purpose and the application of alternative approaches and their positive thoughts about alternative approaches should also be directed towards the application. The researches about the application which was done for teaching mathematics in the study can be conducted for teaching division. The students who are seen as unsuccessful in mathematics classes can be trained with mathematical modeling activities and their effects on the students' attitudes towards mathematics and their achievements in mathematics can be analyzed.

That the parents' opinions were positive about the application and their children's saying that they linked mathematics to themselves and the environment have supported the claims of the researchers (Henn, 2007) for realistic mathematics education.

That the math perceptions of the students tended towards learning rather than memorizing and the students continued the application with high motivation are similar to the findings obtained in other activity-based studies (Brechtling and Hirsch, 1977; Yazıcı, 2002; Castronova, 2002) related to student opinions.

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