

In Math Children Motivated and They Succeeded by Influence of Teaching of Values

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ABSTRACT This research aims to assess the effect of activities developed to increase the motivation of students on the level of motivation and success benefiting from the values education approaches. For that purpose, the developed activities were tried to be implemented in accordance with the values education methods. In the research, the pre-test and post-test control group test model was used. The experimental group included 85 participants, and the control group included 92 students. For data of the research, the "Mathematics Lesson Motivation Scale" and "Mathematics Lesson Achievement Test" were used. Results of analyzed data proved that there was a significant difference in favor of the experimental group in both Mathematics Lesson Motivation Scale according to the final measurement results of the experimental and control groups [$t(175)=10.763$, $p<0.05$], and Mathematics Lesson Achievement Test [$t(175)=6.248$, $p<0.05$]. The data proved that values education methods were efficient upon increasing the success levels of students.

INTRODUCTION

No society advancing without mathematics can be imagined. Today, scientific and technological advancements cause quick cultural, social and economic changes, bring onto the agenda new information, skills, technical and technological tools, force everybody producing goods and service to constant learning and maturation. Therefore, the world needs people who know, understand and interpret the mathematics of it. Besides, mathematics teaching has a very substantial place in perception, analysis, synthesizing and evaluating, as well as development of advanced thinking skills such as establishing relations between events and phenomena. However, a mathematics class is generally known to be hard to learn and teach. Although it is considered to be a boring, unentertaining, hard-to-understand, unlovely course, and expressed by students to be a nightmare, cause stress and failure by most, it is usually described by the teachers as a hard-to-teach course with low student interest. Therefore, it is seen that several students are concerned thinking that mathematics is hard and they will fail the mathematics course, and that they develop a negative attitude toward this course. This starts from primary school and continues as school years progress. Consequently, students have a negative attitude and lack of trust for this course.

Therefore, they form the opinion that they are not smart enough to learn mathematics, and think this is not a field they would deal with (Çağlar and Ersoy 1997; Çakmak 2000; Baykul 2001; Akin 2007; Kaya 2009; Gürsoy 2010).

In the research conducted by Özdemir (2001), it was seen that most of the students gave answers that this class is hard, to questions on whether mathematics and mathematics course are hard. An evaluation of these reflections reveal that the fundamental reason of student failure is not the mathematics course itself, but rather the fact that an opinion is formed in the students' minds on the hardship of the course. Similarly, it was seen that several students answered 'Yes' to the question, "Are you afraid of failing the mathematics course? (Do you experience?)". This shows parallelism with the result mentioned above. These opinions support that the mental attitude of the students on the hardship of the mathematics course will result in the failure of the students in the course (Cited in Iseri 2004).

In a research (Altun 2009: 573) where the reasons of failure and the solution proposals toward eliminating such reasons of failure are investigated, lack of concern and motivation of the students was set forth as one of the most significant reasons of failure of the students. Besides, it was highlighted in this research that the motivation and interest of the students are significant for them to be successful. Accord-

ing to Yavuzer (1997) and Açıkgöz (2003), one of the most significant factors affecting success in mathematics teaching is the level of motivation of the students about the course. Unsuccessful students are generally ones with deficient learning motivation. A motivated individual strives to succeed in what he/she does. These individuals are the ones saying, "I want to succeed", in other words, they are motivated for success. The fear of failure of the individual results in escape and quitting (Tural 2005). Therefore, the answer to the question, "Why are we learning mathematics?" should be provided to the students first, no matter which method and technique is used in mathematics teaching. This answer should be provided with a wide perspective ranging from daily life needs to scientific areas to motivate the students (Tas 2013).

Motivation is seen as a potential power guiding attitude and influencing success directly. According to the definition, motivations of the students can emerge comprehension, emotion and attitude (Wæge 2009: 85). In the studies by Nuttin (1984) and Buck (1999), motivation was taken as "a potential that can manifest itself as comprehension, emotion and behavior to guide the attitudes forming the emotional control system" (cited in Hannula 2006: 67). Besides, it is believed that motivation is the internal condition of an individual for something. Motivation has a power to increase the power of the relation between the input and output of human behaviors. It expresses reasons guiding to a certain target, performance of a certain activity or efforts and energy increase to reach a target. These factors influence the inclusion of the content of the types of motivation of the individual, the intensity of the needs and the psychological process (Kleinginna and Kleinginna 1981 cited in Liu and Lin 2010).

According to Spitzer (1996), Akbaba (2006) and Çanakçı (2008), a student not motivated enough is not ready to learn. Students generally learn the issues they are interested in or curious about in a shorter time. It can be said that students are more careful about and interested in courses, complete the homework and work for exams more when they are motivated. Belief in the benefit of mathematics, concern, curiosity, level of liking, need and similar other mathematical learning motivation conditions are directly related to success. It can be said that the difficulties of learning in school and classroom as

well as disciplinary incidents are mostly related to deficiency of motivation. As a result, students are only as successful as they are motivated. In other words, there is a positive relation between motivation and success. However, although the effectiveness of motivation on learning and behavior is accepted, it generally remains unknown how to use it in designing education and what that means. This, however, causes that motivation is not taken into consideration adequately or made little of in construction of the design of education.

Particularly, Cavallo (2002) specifying that motivation is highly important in primary schools, highlighted that teachers should give place to studies to attract the attention of the students. The role of the teachers is very important in increasing the levels of motivation of the students (cited in Yaman and Dede 2007). However, the level of motivation in the learning process can be determined with a series of behaviors that can be indirectly observed through preference among targets and target-focused actions (Aktan and Tezci 2013). Besides, all students cannot be motivated similarly. While some students are motivated with success, others can be motivated with games, puzzles, interesting problems, appreciation, and awards during the course.

As a result, the individual differences, interests, wishes, and needs of the students are very significant factors affecting their levels of motivation. It can be thought that these factors are directly related to one's values. According to Aydin (2003), Oktay (2007), Quisumbing and Leo (2005), Özensel (2003) and Rokeach (1973), values affect all aspects of life knowingly or unknowingly to empower opinions and thoughts. Ways of determination of good and evil, ideal thinking and behaving are formed entirely. They represent wishes and targets, the reasons and purposes one seeks. Consequently, they form the driving force behind the individual and group behaviors. Values play a particularly significant role in formation of personality, shaping of the worldview and fashion of solution of problems. They determine the steps to take, the decisions to make, and the nature of reactions to something one opposes to. In other words, values guide life and regulate decisions and plans.

Inam (2009) expressed the significance of developing values in the education process on the subject by saying, "*We think and learn things after we think that it's worthy of learn-*

ing. This is very important in science. Unfortunately, we cannot give that to children. However, if the child can experience the sense of worthiness in relation with the issue he/she is to learn, and thinks, 'I will learn very valuable things, and with it, I will make my life more valuable and meaningful', then we would be able to eliminate some problems we encounter in education."

In recent years, experts have agreed that studies should be conducted on teaching of values in shaping several school characters. However, mostly the used sources and materials are not at the level of the students, or the taught information does not fit into the thought system of the students. Nevertheless, development is faster when new principles and movements are consistent with the understanding and nature of the child. In case of inconsistency, distrust will emerge, and no advance will be seen (Davis 2006; Sims 2003). Therefore, the students should understand why a value should be gained before learning the meaning of that value. The values should be taught to students in a way to make them gain the nature of the values. Teaching of the values knowledge alone does not guarantee acceptance of the actions governing ensuring of consistency. Here, it is advocated that concepts and methods can be taught, however, values are not taught only with texts and courses such as cooking, but rather practice and presentation are needed and that they should be brought to the hearts of the students (Hossain and Marinova 2004).

Today, several educational approaches are in question on how the values should be provided in a consistent manner. The most frequent of these approaches are concealed teaching of values (implicit program) approach, value transmission (direct teaching of values), value explanation (value clarification) approach, value analysis approach, moral judgment (moral dilemma/moral growth) approach and holistic approach. Fair community schools approach of Kohlberg is a value training approach via action and observation (Kim Suh and Traiger 1999; Huitt 2004; Lovat 2006; Doganay 2007).

There are studies in the field showing that activities regarding teaching of values influence the attitude and behaviors of the students about the subject positively (Tahiroglu 2013; Samur

2011; Cheung and Lee 2010; Aladag 2009; Balci 2009; Demirtas 2009; Taylor 2007; Viadero 2003). An examination of the findings from these studies may show that some activities and programs developed toward teaching of value influences the students to develop positive attitudes and behaviors toward the concerned values.

Considering the explanations and researches above, it can be seen that mathematics is very important for individuals and societies. However, it is a subject known to be hard to learn and teach, and it is defined with words such as nightmare, fear, stress, and failure by most of the students, and that the leading prerequisite of success in mathematics is motivation. It is known that factors influencing motivation are directly related to one's values. In view of these explanations and researches, it was assumed that teaching of values methods would develop a sensation of worthiness toward mathematics, would increase their motivations, and thus their mathematical success would rise. By virtue of this assumption and benefiting from the aforementioned teaching of values approaches, activities were developed toward motivational factors for the students such as being successful, inclination to targets, self-confidence development, inclination to interests, wishes and needs, and being appreciated aimed at developing the sensation of value in students, and thus it was tried to investigate the effects of such factors on the mathematics motivation of the students and their levels of success.

Purpose

This study aims to assess the effect of the activities developed for teaching of values approaches on the motivation and success levels of students in mathematics class.

Answers to the following questions were sought in line with this objective:

- ♦ Is there a meaningful difference between the trial group and control group, especially in favor of the trial group the levels of motivation of the trial group students?
- ♦ Is there a meaningful difference between trial group and control group, especially in favor of the trial group between the levels of success in "length measurement, time measurement, liquid measurement and weighing" of the trial group students

METHODOLOGY

Research Design

This research has been designed in accordance with the quantitative data collection method techniques. The research used a pretest-posttest control group experimental method. In this model, activities toward motivational factors such as being successful, inclination to targets, self-confidence development, inclination to interests, wishes and needs, and being appreciated developed in accordance with the teaching of values methods have been applied on the trial group only. No procedure was applied to the control group in relation with teaching of values apart from the unit activities in the teacher's guidebook for 4th grade mathematics class in use.

Participants

The research was held in the second semester of the 2013-2014 educational year on X primary school's 4th grade students (85 students: 49 girls, 36 boys) and Y primary school's 4th grade students (92 students: 48 girls, 44 boys) being taught in two primary schools affiliated to the Nevsehir Province National Education Directorate. Two groups were formed by way of impartial appointment method as X primary school being the trial and Y primary school being the control group. The equivalence of the groups has been determined according to the *Mathematics Course Motivation Scale* pre-test results and student success levels (that data presented at findings) from the school records (for mathematics course). Besides, the economic levels, educational condition, jobs, marital status of parents as well as number of siblings information were examined from the school records, and it was seen that they were very close to each other from these aspects.

Data Collection Process

In this research, the *Mathematics Course Motivation Scale* developed by Tahiroglu and Çakir (2014) was used for determination of the levels of motivation of the students for mathematics course, and the Mathematics Course Achievement Test developed by Çakir (2013) was used to determine the levels of success on matters of Length Measurement, Time Measurement, Weighing and Liquid Measurement.

Mathematics Course Motivation Scale

The Mathematics Course Motivation Scale prepared by Tahiroglu and Çakir (2014) for the purpose of developing a valid and reliable measurement tool measuring mathematics learning motivation of primary school 4th grade students measures a total of 32 items under five factors. The items on the scale were made according to the five participation levels as exemplified by the "Likert" type scales as, "*I totally agree, I agree, I partially agree, I don't agree, and I absolutely disagree*". The researchers specify that validity and reliability analyses were made on expert opinion and data from 276 students at the stage of the development of the scale. It was specified that the scale be bestowed to expert opinions for the purpose of determination its adequacy in terms of content validity and suitability for its purpose of use, and that necessary corrections were made in line with the opinion, criticism and suggestions of the experts. The factor analysis of the scale was made for contribution validity, and a 5-factor solution was reached as a result of this procedure. These factors in order are "Motivation Toward Being Appreciated (5 items)", "Motivation Toward Interests, Wishes and Needs (7 items)", "Motivation Toward Developing Self-confidence (6 items)", "Motivation Toward Success (8 items)" and "Motivation Toward Targets (6 items)". It was specified that the internal consistency factors (Cronbach Alpha) were calculated for the reliability study of the scale. The five factors in this scale have been analyzed separately in this process. As a result, the internal consistency factor of the entire scale of 32 items has been found as alpha 0.93. Besides, the test applied to the sample group of 157 people 4 weeks later had a calculated internal consistency factor of alpha 0.91 after the retest.

Mathematics Course Achievement Test

This test has been developed by the researcher (Çakir 2013) in a way to involve the gains in sub-learning fields such as "length measurement, time measurement, liquid measurement and weighing" from the prime school 4th grade mathematics class. The test is measured with a total of 28 questions toward sub-learning fields such as "length measurement, time measurement, liquid measurement and weighing". Four options

(options A, B, C, D) have been formed for each question on the test, from which one was correct and three were wrong. The researcher specifies that validity and reliability analyses were made on expert opinion and data from 200 students at the stage of the development of the scale. It was specified that the test was bestowed to expert opinions for the purpose of determination its adequacy in terms of content validity and suitability for its purpose of use, and that necessary corrections were made in line with the opinion, criticism and suggestions of the experts. Furthermore, in the analyses for the validity and reliability of the test, item strength index (pj), item separative force index (item validity) (rjx), item reliability (rj), item standard deviation (sj), covariance between items (cjk) and correlation between items (rjk) were examined. After this procedure, improper items were excluded to give its final form to the test. As a result of the analyses on the last form of the test, KR-20 reliability factor was determined to be 0.859, and the average difficulty of the test 0.654. According to the final test results, item strength indexes ranged between $0.79 < p < 0.25$; and the separative index between 0.14 and 0.59. The final form of the test involves 8 items for length measurement, 6 items for time measurement, 7 items for weighing, and 7 items for liquid measurement.

Experimental Process

1. *Mathematics Course Motivation Scale* and *Mathematics Course Achievement Test* were applied simultaneously as preliminary test on trial and control groups.

2. Activities developed in accordance with the teaching of values methods were applied in accordance with the subjects of length measurement, time measurement, weighing and liquid measurement in 4th grade mathematics class for the purpose of motivating the students and developing a sense of value toward mathematics. These activities have been prepared taking into consideration the motivational condition of 4th grade students for mathematics class and expert opinion was taken. Activities were tried to be developed toward bringing value to mathematics course in general and toward motivational factors such as being successful, inclination to targets, self-confidence development, inclination to interests, wishes and needs, and being ap-

preciated in particular. In this process, activities prepared for the purpose of making them perceive the necessity of mathematics, its effect on human life, in short how valuable it is for human life were developed toward motivational factors such as being successful, inclination to targets, self-confidence development, inclination to interests, wishes and needs, and being appreciated in mathematics course.

Each of the activities consists of three stages of knowing, understanding and associating (cognitive process), appreciation (affective process), motion (evaluation). Fundamental information has been provided on subjects such as significance of mathematics, what it brings when successful, and the contribution of mathematics in reaching targets. In the appreciation (affective process) process, new approaches related to teaching of values, and methods such as "Explanation of Values", "Value Analyses" and "Moral judgment", "Learning by Action and Observation" were benefited from separately or by combination in accordance with the content of the prepared activities for the purpose of assistance to the students in selection of their own values accurately and transform such values into behaviors. Drama, music, empathy and various games were also benefited from in this section. As to the evaluation process, it consists of some questions prepared in accordance with the teaching of values methods.

3. The subjects of length measurement, time measurement, weighing and liquid measurement included in the 4th grade mathematics class curriculum were applied by an impartial teacher (classroom teacher S.C. with experience of 18 years) on both groups (trial and control) using the same methods and techniques within the framework of the normal program after the activities prepared to motivate the students and to develop their senses of value are applied by the researcher. Implementation period lasted 20 hours in 5 weeks (the period allocated for the subjects of Length Measurement, Time Measurement, Weighing and Liquid Measurement). In this process, an activity toward increase of the motivations of the students and development of their sensations of value was applied (the activities were applied in periods of 5-15 minutes before each course time). An example of the activity applied in the trial process of the research has been provided in Annex-1.

4. No implementation was made to the control group in relation with the activities developed in accordance with the teaching of values processes, however, activities within the normal course teaching process were applied in relation with the subjects of length measurement, time measurement, weighing and liquid measurement within the framework of the curriculum program only.

5. Mathematics Course Motivation Scale and Mathematics Course Achievement Test were applied simultaneously as final test on trial and control groups.

Data Analysis

Analysis of the Data from Mathematics Course Motivation Scale

In the group comparisons after having acquired the preliminary test and final test points of the trial and control groups Mathematics Course Motivation Scale, t-test (Independent Samples t-test) was used for sampling, and 0.05 reliability level was adopted as the meaningful level. "Kolmogorov-Smirnov" test was used for the suitability of the t-test. Microsoft Excel program was used for the purpose of numerical entry of the data on the computer, and then they were transferred to SPSS data entry. In entry of the affirmative items included in the scale, "I totally agree," was ranked 5, "I agree" was 4, "I partially agree" was 3, "I do not agree" was 2, and "I disagree absolutely" as 1. Reverse coding has been made in negative items.

Analysis of the Data from Mathematics Course Achievement Test

In the group comparisons after having acquired the preliminary test and final test points of the trial and control groups Mathematics Course Achievement Test, t-test (Independent Samples t-test) was used for sampling, and 0.05 reliability level was adopted as the meaningful level. "Kolmogorov-Smirnov" test was used for the suitability of the t-test. Microsoft Excel program was used for the purpose of numerical entry of the data on the computer, and then they were transferred to SPSS data entry. "0" was assigned to those leaving the questions blank,

those marking the wrong option or marking more than one options, and "1" was assigned to those marking the correct option. According to this procedure, if there is a total of 28 questions with each correct answer 1 points, the level of success increases as the average approaches 28, and the level of success declines as it approaches 0. In other words, points were evaluated over 28 full points.

FINDINGS

Findings on the Levels of Motivation of Trial and Control Group Students

Mathematics Course Motivation Scale was applied to the trial and control group students before and after trial procedure as preliminary test and final test for the purpose of looking for an answer to the question: "Is there a meaningful difference in favor of the trial group between the levels of motivation of the trial group students to whom the activities developed to increase the motivation levels of the students benefiting from the teaching of values approaches in 4th grade mathematics class and of the control group students who were taught within the framework of the curriculum program only?" The data obtained from these implementations have been evaluated with the t-test (for independent samples) analysis method. All of the 32 items under the Mathematics Course Motivation Scale (considering a holistic evaluation of the motivational levels of students toward mathematics) consisting of 5 sub-aspects (factors) were analyzed under a single aspect.

A normal distribution (One-Sample Kolmogorov-Smirnov Test) test was made to reveal whether the points of the subjects from the preliminary test are appropriate for normal distribution for the applicability of the t-test, and $p=0.42$ was found as a result of the test. According to this result, points regarding the measurements in the preliminary test concord with normal distribution ($p=0.42$; $p>0.05$). Independent samples t-test was applied in the research taking into consideration the normal distribution (One-Sample Kolmogorov-Smirnov Test) test results. Findings related to the preliminary test points of the trial and control groups have been shown in Table 1 according to the applied test results.

Table 1: Comparison of Mathematics Lesson Motivation Scale pre-test scores

Group	N	\bar{x}	Sd	Df	t	p	Cohen's d
Experimental	85	3.50	.402	175	.926	.356	0.139
Control	92	3.57	.543				

$p > 0.05$

As can be understood from Table 1, there is a 0.7 point difference in favor of the control group between the average points earned from the preliminary test of Mathematics Course Motivation Scale from a single aspect of the students included in the trial and control group before the trial procedure. On testing whether or not such difference is meaningful using a t test at 0.05 meaningfulness level, t value was found to be .926 [t(175)=.926, $p > .05$]. This result shows that the difference between the arithmetic averages of both groups is not meaningful. In other words, there is no meaningful difference between the pre-procedure levels of motivation of the students included in the trial and control group toward mathematics lesson.

After the preliminary test results, it was researched if there was a meaningful difference between the final test point averages of the subjects in both groups for the purpose of observing the efficiency of the activities developed to increase the motivation levels of the students benefiting from the teaching of values approaches in 4th grade mathematics class. Findings related to the final test points of the trial and control groups from the Mathematics Course Motivation Scale have been shown in Table 2.

Table 2: Comparison of Mathematics Lesson Motivation Scale post-test scores

Group	N	\bar{x}	Sd	Df	t	p	Cohen's d
Experimental	85	4.26	.269	175	10.763	.000	1.627
Control	92	3.54	.564				

$p < 0.05$

As can be understood from Table 2, there is a 0.72 point difference in favor of the trial group between the average points earned by the students in the trial group from the final test of Mathematics Course Motivation Scale. On test-

ing whether or not such difference is meaningful using t test at 0.05 meaningfulness level, t value was found to be 10.763 [t(175)=10.763, $p < 0.05$]. This result shows that there is quite a meaningful difference in favor of the trial group between the levels of motivation of the trial group students to whom the activities developed to increase the motivation levels of the students benefiting from the teaching of values approaches in addition to the 4th grade mathematics class curriculum and of the control group students who were taught within the framework of the curriculum program only.

Apart from such analyses, the preliminary test and final test points of the subjects included in both groups were compared to see the developments of the groups within themselves before and after the experimental procedure. A comparison of the preliminary test and final test points of the trial group to this end shows a difference of 0.76 points in favor of the final test between average points. On testing whether or not such difference is meaningful using t test at 0.05 meaningfulness level, t value was found 14.455 [t(168)=14.455, $p < .05$]. This conclusion shows a meaningful difference in favor of the final test points of the trial group. A comparison of the preliminary test and final test points of the control group shows a difference of 0.03 points in favor of the preliminary test between average points. On testing whether or not such difference is meaningful using t test at 0.05 meaningfulness level, t value was found 0.403, and p value 0.687 [t(182)=0.403, $p > 0.05$]. This result shows that there is no meaningful difference between the preliminary test and final test points of the control group.

Findings on the Levels of Success (Achievement) of Trial and Control Group Students

Mathematics Course Achievement Test was applied to the trial and control group students before and after trial procedure as preliminary test and final test for the purpose of looking for an answer to the question: "Is there a meaningful difference in favor of the trial group between the levels of success in subjects of "length measurement, time measurement, liquid measurement and weighing" of the trial group students to whom the activities developed to increase the motivation levels of the students ben-

efiting from the teaching of values approaches in 4th grade mathematics class and of the control group students who were taught within the framework of the curriculum program only?" The data obtained from these implementations has been evaluated with the t-test (for unrelated samples) analysis method. According to the applied test results, findings related to the preliminary test points of the trial and control groups have been shown in Table 3.

Table 3: Comparison of Mathematics Lesson Achievement Test pre-test scores

Group	N	\bar{x}	Sd	Df	t	p	Cohen's d
Experi-mental	85	5.75	2.967	175	.414	.680	0.062
Control	92	5.93	2.877				

$p > 0.05$

As seen in Table 3, there is a 0.18 point difference in favor of the control group between the average points earned from the preliminary test of Mathematics Course Achievement Test of the students included in the trial and control group before the trial procedure (approximately half point over 28 full points). On testing whether or not such difference is meaningful using t test at 0.05 meaningfulness level, t value was found 0.414 [$t(175)=0.414$, $p > .05$]. This result shows that the difference between the arithmetic averages of both groups is not meaningful. In other words, there is no meaningful difference between the pre-trial procedure levels of success of the students included in the trial and control group toward in subjects such as "length measurement, time measurement, liquid measurement and weighing".

After the pre-test results, it was questioned whether there is meaningful difference between the final test points of the trial and control group students to test the effectiveness on the level of success of the students of the developed activities developed to increase the motivation levels of the students benefiting from the teaching of values approaches in addition to the 4th grade mathematics class curriculum. The findings regarding this analysis have been presented in Table 4.

As seen in Table 4, there is a 1.98 point difference in favor of the trial group between the average points earned by the students in the

Table 4: Comparison of experimental and control groups' post-test scores of Mathematics Lesson Achievement Test

Group	N	\bar{x}	Sd	Df	t	p	Cohen's d
Experi-mental	85	16.97	4.592	175	2.987	.003	0.415
Control	92	14.99	4.223				

$p < 0.05$

trial group and in the control group from the final test of Mathematics Course Achievement Test. On testing whether or not such difference is meaningful using t test at 0.05 meaningfulness level, t value was found 2.987 [$t(175)=2.987$, $p < .05$]. This result shows that there is quite a meaningful difference in favor of the trial group between the levels of success on subjects such as "length measurement, time measurement, liquid measurement and weighing" of the trial group students to whom the activities developed to increase the motivation levels of the students benefiting from the teaching of values approaches in addition to the 4th grade mathematics class curriculum and of the control group students who were taught within the framework of the curriculum program only.

DISCUSSION

As indicated in the explanations above, no meaningful change occurred in the motivation levels, rather a decline observed in average points of the students of the control group. It is seen that "several students were concerned thinking that mathematics is hard and they will fail the mathematics course, that they lost their self-respect, and that they develop a negative attitude toward this course. Therefore, they form the opinion that they are not smart enough to learn mathematics, and think this is not a field they would deal with" (Çakmak 2000; Baykul 2001; Kaya 2009; Gürsoy 2010). Considering these explanations, a concern of failure toward mathematics, having difficulty with mathematics, and lack of self-confidence as reasons can be shown as the reason of decline in the measurements after the study in the motivation levels of the students (a decline of 0.03 points in average points) of the control group.

An examination in the pre-trial procedure measurements of the success levels of the stu-

dents participating in the study shows that there is a similarity between the levels of success on subjects such as “length measurement, time measurement, liquid measurement and weighing” in the mathematics course of the students included in the trial and control groups are similar. However, in measurements after the trial procedure, a meaningful development has been observed in the levels of success in favor of both the trial and control groups. This can be interpreted that the activities applied within the framework of the mathematics course curriculum has a positive influence on the success levels for subjects such as “length measurement, time measurement, liquid measurement and weighing”. However, no meaningful difference has been observed in favor of the trial group comparing the final test points of the trial and control groups. This, however, supports the suggestion that implementation of the activities developed to increase the motivation levels of the students benefiting from the teaching of values approaches in addition to the 4th class mathematics course curriculum would lead to better results in levels of success of the students.

One of the most significant factors influencing success in mathematics teaching is the level of motivation of the students about the course. Unsuccessful students can be generally described as ones with deficient learning motivation. Nevertheless, a motivated individual strives to succeed in what he/she does. These individuals are the ones saying, “I want to succeed”, in other ways, they are motivated for success. The fear of failure of the individual results in escape and quitting. Therefore, no matter which method and technique is used in mathematics teaching, first it is necessary to motivate the student psychologically (Yavuzer 1997; Açikgöz 2003; Tas 2013).

In this study, it targeted to increase the motivation levels of the students by developing their sense of value toward the mathematics course. Because, according to Özensel (2003) and Quisumbing and Leo (2005), values affect all aspects of life knowingly or unknowingly. Ways of determination of good and evil, ideal thinking and behaving are formed entirely by values. They determine the steps taken, the decisions made, and the nature of reactions to something one opposes. According to Demirhan Iscan (2007), “Values form a general framework for the attitudes that guide behavior, and in this

context, directs the attitudes of the individual.” Considering the effects of values on human life in view of these explanations, it can be thought that teaching of values will make a significant contribution to increase of the motivation of the students for mathematics course.

There are studies in the field showing that activities regarding teaching of values influence the sense of value, emotions, attitudes and behaviors of the students about the subject positively (Tahiroglu 2013; Samur 2011; Cheung and Lee 2010; Aladag 2009; Balci 2009; Demirtas 2009; Taylor 2007; Viadero 2003). An examination of the findings from these studies may show that some activities and programs developed toward teaching of values influence the students to develop positive attitudes and behaviors toward the concerned value/s.

An examination of the findings of this study shows that the control group students who were tried to be motivated applying the activities developed using the teaching of values methods in mathematics education provided with the same method and techniques by the same teacher had 16.97 correct answers to 28 questions as contrast to the control group students having an average of 14.99 correct answers without being motivated using the teaching of values methods. This result shows that the teaching of values methods is effective in increase of the levels of success of the students by raising their motivation in mathematics course.

When the findings above are taken into account, it is seen that students with higher motivations are more successful than the others. Soltanzadeh et al. (2013) stated that students with higher motivations have higher success grades as a result of their study named “*The effect of active learning on academic achievement motivation in high schools students*”. Tella (2007) found that motivated students have higher academic performances in his study named “*The impact of motivation on student’s academic achievement and learning outcomes in mathematics among secondary school students in Nigeria*”. Apart from these, when the findings of studies were carried out by research scientists like Gottfried (1985), Pintrich and De Groot (1990), Schunk (1991), Andrew and Vialle (1998), Busato et al. (2000), it is emphasized that students with higher motivations on the related courses or topics have higher success and students with low success have lower motivations.

Also, it was stressed that if the motivations of students advances, correspondingly their academic success advances too. The findings of this study have parallels with these studies. That is to say, in the study carried out by using values education methods, it was seen that motivations of testing students about mathematics advanced and in parallel with this they had higher academic success than control group students. Therefore, it can be said that student motivation about mathematics can be advanced by using values education methods and accordingly, they can have higher academic success.

CONCLUSION

An examination in the pre-trial procedure measurements of the motivation levels of the students participating in the study shows that the motivation levels toward mathematics course of the students included in the trial and control groups were similar. However, in measurements after the trial procedure, a meaningful difference has been observed in favor of the trial group comparing the final test points of the trial and control groups. Besides, a quite meaningful difference has been observed in favor of the final test comparing the preliminary test and final test points of the trial group. No meaningful difference has been observed on comparison of the preliminary test and final test points of the control group. In other words, it was seen that the “activities developed to increase the motivation levels benefiting from the teaching of values approaches in addition to the 4th class mathematics course program” applied on the trial group students increased the motivation levels of the students for mathematics course, however that no meaningful change occurred in the motivation levels in the group on whom this activity was not applied. This supports the suggestion that the activities developed to increase the motivation levels of the students benefiting from the teaching of values approaches would lead to positive results toward motivation in the mathematics course.

RECOMMENDATIONS

In conclusion, it was noticed that values education methods were efficient upon increasing the success levels of students through improving their motivation in mathematics lesson.

However, this conclusion did not guarantee the permanence of student acquisitions. Therefore, it was suggested to conduct researches upon the acquisition of mathematics values for increasing the motivation in mathematics lesson using values education methods and to analyze the permanence of student acquisitions, if possible, in these researches. Similar researches can be carried out with different age groups, and the effects of activities upon student groups at different student groups can be analyzed. When considering that the behaviors acquired at younger ages become more permanent, similar researches have been suggested to be carried out upon younger age groups.

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APPENDIX

Annex 1: Example of Activity

Activity – 1Grade: 4th grade **Lesson:** Mathematics
Learning Fields: Length Measurement, Time Measurement, Weighing and Liquid Measurement
Approximate Time: 40+40=80 minutes
Level: Fourth Grades

Purposes

Helping for motivation of students towards mathematics lesson,
 Helping students for acquiring mathematics value.

Materials: An audiovisual record presenting the importance of mathematics, computer, pictures, projection, activity papers, free A4 paper, notebook,

The Approach to be Used: Value expression and value analysis

Preparation: The record to be watched in the lesson will be prepared, the materials (computer and projection) for watching the material will be prepared, and pre-test will be performed. The notebooks and A4 papers to be distributed to students will be supplied.

Process

- The students are asked about what the technology (instruments, etc.) they use in their daily life includes. Additions can be provided according to the answers given by students. The place and importance of mathematics for the improvement of technology is expressed. Then –depending upon this- the place and importance of mathematics upon the human life is expressed by the help of audiovisual records.
- The students are required to think about what is mathematics for in their own life. Then, they were asked to imagine on what they can do in their later life if they know mathematics better, and how this can change their life. Time is provided for this process.
- The questions below are addressed and they are asked to answer considering the records they watched.
 - Is mathematics valuable for you? Can you explain why you think so?
 - In order to help students for being sure on their thoughts: The questions as “*Are you pleased to think so? Do you mean..... (Repeat their ideas)? Are you serious on saying ?*” can be addressed.
 - What do you do for the things (mathematics) you admire? “If they do nothing: Do you think to do something from this time forth? What do you think to do?” “If they do something: What else do you think to do?”
 - Is it really important for you to do what you said?
 - What do the people around you tell about this? Is it important for you?
 - What happens if you do not do the things you said?
 - If you do what you mentioned, how is your life affected subsequently? Is it a result you want?
- Within the framework of curriculum, normal lesson process related to length measurement, time measurement, weighing and liquid measurement is provided. After completing this process (2 lessons later), the procedures below are performed (without finishing the lesson).
 - What do you think to do related to mathematics after today? What can be the reasons to think so?
 - What can be the results of behaving in accordance with your thought? How will this be beneficial? Will this make you happy?
 - If you encounter a problem (if you don't understand or study the subject, or the other problems) what do you think to do? Time is provided for students to think and they are required to write their thoughts. After completing this process, homework related to the subject is given to students to study in their free time.