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THE RELATIONSHIP BETWEEN MATH ACHIEVEMENT MOTIVATION AND REFLECTIVE THINKING SKILLS TOWARDS PROBLEM SOLVING OF THE 8TH GRADE STUDENTS

BY

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LIST OF ABBREVIATIONS

AMS: Achievement Motivation Scale

MAM: Math Achievement Motivation

Math: Mathematics

MoNE: Minister of National Education

N: Sample size

NCTM: National Council of Teachers of Mathematics ,

p: Significance level

PISA: Program for International Student Assessment

RTSTPS: Reflective Thinking Skills Towards Problem Solving

SD: Standard deviation

TEOG: Temel Eğitimden Ortaöğretime Geçiş

TIMMS: Trend in International Mathematics and Science Study

ÖZET

Bu araştırmanın amacı ilköğretim 8. Sınıf öğrencilerinin başarı güdüsü düzeylerini ve problem çözmeye yönelik yansıtıcı düşünme becerisi düzeylerini incelemektir.

Araştırma İstanbul il sınırları içerisinde yer alan 2 özel 2 resmi ilköğretim okulunda öğrenim gören 461 öğrenci ile gerçekleştirilmiştir. Bu araştırmanın verileri Umay (2002,a) tarafından geliştirilen "Başarı Güdüsü Ölçeği" ve Kızılkaya (2009) tarafından geliştirilen "Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerisi Ölçeği" kullanılarak toplanmıştır.

Bu araştırma da niceliksel araştırma metodu kullanılmıştır. Araştırmanın verilerinin analizinde Ortalama, Standart Sapma, Frekans ve Yüzde kullanılmıştır.

Araştırmanın sonucunda; öğrencilerin matematik dersine ilişkin başarı güdüleri ortalaması ($\overline{X}$=22,78; Sd=4,13). Öğrencilerin başarı güdüsü ölçek ortalaması, başarı güdüsü ölçek orta noktasından düşük bulunmuştur.
Öğrencilerin problem çözmeye yönelik yansıtıcı düşünme becerileri ortalaması ($\overline{X}$=33,84; Sd=11,70). Öğrencilerin problem çözmeye yönelik yansıtıcı düşünme becerisi ölçek ortalaması, problem çözmeye yönelik ölçek orta noktasından düşük bulunmuştur. 8. Sınıf öğrencilerinin matematik dersine yönelik başarı güdüleri ile problem çözmeye dayalı yansıtıcı düşünme becerileri arasında anlamlı ve pozitif bir ilişki bulunmuştur r=.63, n=461, p<.01.

Anahtar sözcükler: Matematik, başarı güdüsü, yansıtıcı problem çözme becerisi

ABSTRACT

The purpose of this study is to examine the relationship between the 8th grade students' math achievement motivation and their reflective thinking skills towards problem solving.

The research was conducted across 2 private and 2 public primary schools and on 461 students in those schools. The data were gathered by the "Achievement Motivation Scale" developed by Umay (2002,a) and the "Reflective Thinking Skill Towards Problem Solving Scale" developed by Aşkar and Kızılkaya (2009). In this study was used quantitative research methods. Arithmetic Mean, Standard Deviation, Frequency, Percentage, and the test of significance of the difference between the percentages were employed to analyze the data of the research.

The research result show that the mean of the achievement motive score is ($\bar{X}$=22,78; Sd=4,13). It was seen that students' achievement motivation scale scores mean is under the midpoint of the achievement motivation scale for mathematics.

The mean of the reflective thinking skill scale towards problem solving scale scores is ($\bar{X}$=33,84; Sd=11,70) in this research. It was seen that students' reflective thinking skills towards problem solving scale scores mean is under the midpoint of it. In addition achievement motives scores positively and significantly correlated with the Reflective Thinking Skill Scale toward Problem Solving Scores, r=.63, n=461, p<.01.

Keywords: Mathematics, Achievement Motivation, Reflective problem solving skills

1. INTRODUCTION

Education is an important area where the studies are conducted for the solution of many problems in the world. Educational sciences have been examined the teaching and learning process of the individual on the how, what, and in what way learned in detail. The Science of Education was revealed scientifically valid data to change individuals' behavior. In the broadest sense of teaching were providing teaching learning activities (Daubler et all, 2014).

Improving the quality of education has been one of the most important pursuits of the educational institutions. In educational programs there are items related to which behaviors to gain to the individuals. Curriculum development is one of the factors in order to built useful classroom settings. From this perspective we take the position that curriculum must significantly based on scientific basis. Curriculum development must respect a number of basic principles: To be based on a needs assessment, to be scientific, based on the applications. "Curriculum" is a difficult concept to provide a limited description (Hitchcock et al., 2002).

Developing a curriculum involve numerous steps, needs analyzing, piloting, planning and development, implementation, evaluation. It includes very comprehensive studies such as syllabus planning, setting philosophy of education, material development testing (Zohrabi, 20149. As Young (2013) pointed today curriculum development is more difficult because of the expanding knowledge and rapid developments in technology. In order to build convenient curriculum we have to be know that students perceptions, beliefs and cognitive skills.

This study focuses on mathematic teaching and learning process within the curriculum theory. The Mathematics curriculum as part of the secondary level curricula aims at teaching students via learning experiences, values and attitudes which supported with global vision (Nicolescu&Petrescu, 2014).

Mathematics is a cumulative lesson. Each step was constituted the basis for the next steps in mathematics learning experiences. Each student puts the steps on top of in an active way. The teacher is a supporeter in each step (Haji, Shahrill and Mundia, 2014).

In the mathematics teaching and learning process, should be made of all the activities in order to achieve a certain goal. This requirement makes it important to mathematics teaching programs. Math curriculum was provided thinking about the math, understanding of general problem solving strategies, to be in a positive attitude towards mathematics. In this context, the mathematics program is a rich and comprehensive process in the learning of mathematics (MEBa, 2005, p. 17).

Knowledge of developments in the field of science and technology in the twenty-first century was changed rapidly and was increasing the need for information. Societies are turning to the concept of world citizenship from individuality. The most important resource is the human resource for countries. As in the advanced countries to support educational research and studies and the development of our education system is very important. Developing countries was gave special attention to mathematics in the curriculum implemented in schools. Within that context, nations place utmost importance to the projects that can train scientists who can keep up with the new world order. One of these projects, the Organization for Economic Cooperation and Development (OECD) launched from 2000 the world's most comprehensive which is in the nature of educational research Program for International Student Assessment (PISA) application.

According to the report of MEB (2012b, p.27), the following dimensions have been addressed with mathematics in PISA;

- editing a given problem as a mathematical problem (formulation),
- solving problems with mathematical knowledge and mathematical reasoning (execution)
- making a decision on the suitability of the obtained results to real life (interpretation/evaluation)

Including in the report of MEB, good problem solving is directly related to the way to be successful in mathematics. In the teaching of mathematics course the way problem-solving process operates bears great importance. Problem solving was required the use of critical, creative, and reflective thinking, analysis and synthesis skills (Soylu & Soylu, 2006, p.99).

One of the main aims of mathematics teaching that the students gain the ability to solve problems encounter in everyday life. Problem solving is a mental process and skills.

According to Căprioară (2014), in mathematics, solving problems represents the most effective concept to contextualization and re-contextualization of concepts, to operational and basic mathematical knowledge transfer to ensure a sustainable and meaningful learning.
One other characteristic that is required for student success is motivation. Motivation takes the fore stage in teaching-learning process since it is the method that enables individuals to willfully pursue their behaviors. Motivation is what determines the power and energy level of any person's behaviors. The vitality and continuity in a person's behaviors and the climbing level of energy indicate that s/he is a motivated individual (Akbaba, 2006, p.143).

As Fidan (1986, p.120) states that there are some aspects of achievement motivation in the classroom teaching;

- Students encourage to get rid of the uncertainty
- The needs of self-actualization give to the students' dignity.
- Students find himself\herself worthy.

Achievement motivation depends on the requirements of success. Individuals' success are confirmed, they would work harder to reach new success. According to Bakar and et all. (2010), it is important to note that motivational variable appeared strongly related to high achievement for instance to high level of intelligence quotient.

On accounts of the reasons listed above, a need has arisen to conduct a research that analyzes math achievement motivation and reflective thinking skills towards problem solving. Analyzing achievement motivation is a recent phenomenon and there are still a limited number of studies providing suggestions particularly on educational programs in Turkey. In addition there are limited quantity of studies that analyze in detail RTSTPS which is associated with achievement motivation. Thus it is considered that present research, focusing on the concept of achievement motivation of which effect on learning is indisputable, shall contribute remarkably to developing various suggestions that can assist students in coping with potential problems they face in mathematics course.

1.1.Concept of Mathematics

As one of the most antique sciences in the history of mankind mathematics has been one focal topic of numerous researches. In the course of time, mathematics just like any other sciences improved itself and defined in different ways by the researchers. Some of these definitions are;

Turkish Linguistic Society explains mathematics as: "A branch of science analyzing in scientific terms the structures, features, correlations of shapes, numbers and multitudes and separated into sub-branches such as arithmetic, algebra and geometry.

Gözen (2001) claims that mathematics is branch of science composed of arithmetic, algebra and geometry. Measureable quantities of arithmetic and algebra can be expressed with the words like “few, very few, a lot, quite a lot” and they exist in nature and society in relation to the qualities of objects. Geometry on the other hand deals with abstract forms. In short Gözen (2001, p.22) argues that “mathematics is branch of science examining abstract shapes that can be manifested via definitions and the qualities of measurable quantities and the fixed points in their interrelations”. Mathematics is a language that uses symbols that are defined in the terms.

Nesin (2010) states that mathematical concepts have been integrated into real life at all times. To illustrate his claim he points to concepts “single”, “circle” and “pi”. Umay (2001, p.234) argues that the main difference between humans and the other living beings is man’s ability to think and mathematics is the most important science known to improve thinking skills. In that way mathematics, by enabling us to find solutions for daily life problems, form relations and use logic, keeps our system of thinking always fresh and alive. Mathematics with a universal language consists of abstractions.

Baykul (2009, p.36) states that mathematics is a universal language formed by utilizing the relations and symbols among magnitudes, numbers and shapes. Mathematics is a science that can analyze existing knowledge, assist us in comprehending our immediate surrounding and logical thinking.

Consequently, by making use of already-existing definitions on mathematics, it would be more reasonable to point to its features instead of suggesting only one definition;

- Since the quantities do not exist on their own in the world, human mind make a division between objects and make them abstract. Hence mathematics is an abstract science.
- Mathematics is a language that makes use of symbols.
- In Mathematics no idea can be explained without grounding on logical reasons.
- A Mathematician conducts his/her researches not on the basis of sensory organs but on the laws of reason. Thus Mathematics is a positive science.
- Mathematical concepts are explained on the basis of necessities and every single concept has its own history.
- After making a connection between undefined concepts and axioms, the rest of the concepts are verified by building on top of them. Mathematics improves reasoning and association skills.

Individuals who have gained all kinds of mathematical thinking skills can solve easily the real life problems. Mathematics is a thinking tool that helps individuals to recognize him/herself and the universe. For this purpose, mathematics teaching is very important in lifelong learning.

1.2.Mathematics Teaching

The developments witnessed in science and technology in the twenty first century point to the rapid transformation of knowledge and the rising demand for knowledge. Societies are now more inclined towards global citizenship concept rather than individualism. To keep up with rapid changes and developments it is known that raising qualified individuals is a requirement. Accordingly, all nations place utmost importance to the kind of projects capable of training young scientists who can adapt to the new world order.One of these projects is The Programme for International Student Assessment (PISA) has been implemented by Organization for Economic and Co-operation and Development (OECD) member states and the Project is geared towards assessing to what extend students can reflect their school education knowledge into daily life (Baykul, 2009). The Project involving 70 states deals with below-listed domains;

I. To what extend students are prepared to cope with the problems faced in information society

II. To what extend students can employ their mathematics and science course knowledge in the new world order mostly based on technology and scientific development

III. To what extend students are endowed with skills and knowledge essential to allow active participation into social life. Mathematics questions integrate the fields below;

   a. Space and shape (geometry)
   b. Transformation and relations
   c. Numbers (arithmetic)
   d. Uncertainty (probability) (MEBb,2012, p.27)

According to PISA, students can be focus on creating mathematical problems in different situations, formulate, analyzing and interpreting these ideas, solving problems, reasoning and effectiveness communication. However, Baykul (2009) posits that in Turkey elementary education mathematics teaching is heavily engaged in operation skills. There is lack of focus on inter-branch transfers, association with daily life and practicing mathematical knowledge which collectively places Turkey into the last ranks in PISA exams. This result awakens the question in mathematics-teaching relevant studies how mathematics is perceived and explained by students and how it is possible to improve mathematical thinking skills. Concerning this position, a number of researchers have emphasized the cognitive and affective stages of learning process. İlhan and Öner Sünkür (2012, p.278) pointed that mathematics anxiety and positive & negative perfectionism are related to predicting elementary school 8th grade students' mathematics success. Yıldız and Uyanık (2004, p.442) draw attention to the below ordered points in mathematics teaching:

- In Mathematics teaching, teachers should go beyond possessing extensive field knowledge but they should also be attentive in selecting the correct teaching methods in transferring their field knowledge to students.
- In Mathematics teaching, activities should be implemented hand in hand with immediate surrounding. In that way, responsibilities can be equally distributed among school-family and student.
- Prior to presenting the concepts to students, assignments should be given to students so that they can come to class prepared in advance.
- In Mathematics teaching, assessment should be objective and students & parents should be provided with sufficient knowledge on this issue.

- Science of mathematics, which is based on abstract thinking, is deemed to be boring and difficult by students. If Mathematics teaching is associated with technology or in other terms with daily life thus become concrete, the problems likely to arise can be solved.

According to Sullivan (2011, p.25) there are six key principles for effective teaching of mathematics.

Principle 1. Articulating goals: This principle emphasises the importance of the teacher having clear and explicit goals that are connected to the pedagogical approach chosen to assist students in learning the goals.

Principle 2. Making connections: This principle is elaborated for teachers as follows; build on what students know, mathematically and experientially, including creating and connecting students with stories that both contextualise and establish a rationale for the learning.

Principle 3. Fostering engagement: Engage students by utilising a variety of rich and challenging tasks that allow students time and opportunities to make decisions, and which use a variety of forms of representation.

Principle 4. Differentiating challenges: Interact with students while they engage in the experiences, encourage students to interact with each other, including asking and answering questions, and specifically plan to support students who need it and challenge those who are ready.

Principle 5. Structuring lessons: Adopt pedagogies that foster communication and both individual and group responsibilities, use students' reports to the class as learning opportunities, with teacher summaries of key mathematical ideas.

Principle 6. Promoting fluency and transfer: This principle is familiar to most mathematics teachers, but it is possible to misinterpret the purpose of practice and prompting transfer.

The learning process will be carried out that the intended goal should be given in a healthy and permanent manner in the teaching of mathematics. According to these principles, planning, implementation and evaluation stages are given a central role to the teacher. The student must be in the interaction of the wide environment.

Baykul (2009) states that in mathematics conceptual knowledge is relevant of relations structured in human mind while operational knowledge is the way algorithm and solution methods of structured relations is expressed via rules and symbols. We employ symbols in order to express the concepts created in human mind. That is why Baykul argues that the main issue in mathematics teaching is setting the link between conceptual knowledge and operational knowledge. Thus mathematics teaching is expected to serve to three objectives below;

- Students can comprehend inter-conceptual relations,
- Students can structure the algorithm of mathematical operations,
- Students can make connections between concepts and interoperational links.

Gürlen (2014, p.1407) emphasized and suggested that ;

> During student-centered activities of teaching mathematics, concrete and cognitive means should be used in visualizing mathematical concepts and ensuring them to be understood, in deepening learning and using what is learnt in solving real-life problems.

Besides Gözen (2001) claims that;

- Considering that mathematics has an abstract structure, mathematics teaching should aim to gain students abstract thinking skills.
- While teaching mathematics students should be encouraged to creative thinking and students' reasoning skills should be improved.
- The functionality of mathematics should be supported via science branches and teaching should be conducted in a multi dimensional perspective.
- Students should be encouraged to reflect the algorithm in mathematics into daily life.
- Mathematics enables students to use pure logic. Having gained a proper mathematics education, students should be able to provide neutral arguments in all events they face in life.

In line with these suggestions, mathematics is not only a branch of science enriching our intellectual power and ability to make connections between events but it is also a subject making students feel happier, more enlightened and satisfied as they study more (Yıldız and Turanlı, 2010, p.363). Mathematics, as a universal language speaking on behalf of all sciences

collectively, is closely intertwined with daily life; thus there are a number of features in mathematics teaching fixed for all age groups. These are;

- students should learn the value of mathematics;
- students should be confident about their capacity to learn mathematics; ·
- students should learn mathematical communication via solving mathematical problems,
- students should be supported while learning mathematics and their achievements should be celebrated.

Nicolescu and Petrescu (2014) consider that;

> "it should be insisted on the concept of continuity of the curriculum in general, the mathematics one in particular, in order to guaranty a coherent and stable frame for learning, so the pupil can acquire not only specific competencies linked to isolated parts of mathematics, but also general ones which can ensure the interdisciplinary and transdisciplinary."

In the case that above-listed features are discarded it is less likely that new attempts in mathematics teaching could provide favorable results at all times (Ersoy and Erbaş, 2005, p. 19).

In most of the stages during education, students face challenges in mathematics lesson and believe that maths is a boring course (Peker & Mirasyedioğlu, 2003, Şenol, Dündar, Kaya, Gündüz&Temel, 2015). In current research a detailed analysis has been presented on the assumptions concerning the difficulty of mathematics lesson.

1.3.Difficulties in Learning Mathematics

Mathematics is one of the most important lessons students have to learn. At the same time, this course is seen as a difficult subject by many students. Ersoy and Erbaş (2005, p.102) report that mathematics is not merely a field designed for scientists and engineers. More over than that it integrates the kind of concepts effective in helping the individuals to maintain their daily lives. Therefore in democratic states people should be accomplished literates in mathematics and improve their mathematical skills.

Dikici and İşleyen (2003, p.105) attest that in order to provide better learning settings for students the factors playing role in their learning activities should be identified and problems originating from these factors should be resolved. In line with this deduction Dikici and İşleyen (2003, p.105) provided the suggestions hereinafter;

- In solving the problems the teacher should guide his/her students and encourage their participation in class. In that way students' increasing accomplishment in problem-solving shall positively reinforce their mathematical motivation.
- Students should be given exercises appropriate to their levels so that their confidence in achievement should be enhanced.
- Students should be enlightened about the functions of mathematics and by providing examples from its daily life use, the lesson should be concretized.
- Since the topics covered in Mathematics lesson increase cumulatively previous subjects and new subjects must be connected and smooth transition should be established.
- While giving definitions on subjects such as relations and functions graphics and diagrams must be used so that students are discouraged from rote learning.

In the light of these suggestions, teachers can be minimized the difficulties in learning activities. Soylu and Soylu (2006, p.109) argue that prior to teaching, a teacher should firstly identify the complex topics and challenges that are likely to cause learning difficulties and conceptual ambiguities in mathematics and come to class prepared in advance. It then becomes possible to alleviate the potential learning difficulties of students.

Literature studies digging out the causes of mathematics fear and anxiety provide a range of results. One result points to the negative attitude of teachers towards mathematics course. To minimize mathematics fear and anxiety, teachers shoulder huge responsibilities (Ölmez&Özel, 2012, Sevindir, Yazıcı& Yazıcı, 2014, Şenol et al., 2015). Teachers should support students in learning activities.

Bozkurt (2012, p.199) states that;

- Teachers should reinforce students' positive attitudes towards mathematics and be more tolerant against students' negative attitudes.
- Teachers should act as a guide and encourage full & active participation in class. In that way students shall have elevated self-confidence.

- Teachers, by providing games on relevant topics, should increase students' love for mathematics.
- Time limits in exams elevate students' anxiety towards mathematics (Hembree, 1990, p.33). Therefore time restricted exams should be replaced with alternative measurement and assessment methods (group works, homework, projects, researches etc.).
- Effective communication between teacher- student should be formed.
- Teachers should possess the required skills to cope with students' anxieties.

Teachers are one of the most important reasons for success in mathematics. At the same time, relevant literature studies prove that teachers are not the mere source of the existing learning difficulties (Baştürk and Dönmez, 2011, Şahin, Erdem, Başıbüyük, Gökkurt and Soylu, 2014). Tatar and Dikici (2008, p.191) argue that learning difficulties in mathematics teaching also emerge from;

- Inadequacy of practical implementation in mathematics teaching,
- Multitude of abstract concepts which are hard for students to grasp and teachers' failure to concretize the topics,
- Incomplete parts in students' mathematical background.

In order to solve these challenges below-listed suggestions have been provided;

- Suitability of materials reinforcing students' abstract thinking,
- Redesigning teaching by considering the factors causing learning difficulties,
- Computer-aided mathematics teaching and relevant visualization.

In the light of above given activities, here are some of the suggestions to minimize difficulties in mathematics teaching;

- teachers should previously identify learning challenges associated with the topics they will narrate and devise applicable methods to solve these problems,
- the abstract concepts should be concretized to maximum length,
- an emphasis should be rendered to readiness level of students.

In the light of these suggestions, it becomes apparent that it is the mission of teacher to guide his/her students in the process of learning. Despite the suggestions, it is inevitable that there will be cases in which students shall still face learning difficulties and failures. Although for a

great number of people mathematics is a pain in life, some individuals value it as a way to make sense of life. So long as students make sense of mathematics they will be able to love it. If the case is opposite, students shall be led to negative feelings. In the field of education more emphasis is given to cognitive dimension whereas affective dimension is ignored. Durmuş (2004a, p.509) claims that one of the reasons related to difficulties in learning mathematics is motivation.

1.4. Motivation

Motivation derives from Latin word "movere" "moving, acting"; "motive" in French and English "motive, driving power". Örücü and Kambur (2008) say that motivation is the thought, desire, demand, fear and hope motivating people by guiding their behaviors. Petri (1996, p.3) explains motivation as the changes in the intensity of behaviors. Intensity of attitudes is indicative of higher motivation. Petri claims that motivation is also a concept designating the direction of behaviors.

Akbaba (2006, p.143) argues that in humans' lives there are intrinsic (personality traits) and extrinsic (environment) factors affecting the momentum, severity and continuity of behaviors. In education, acquisition of intended behavior diverts from daily behaviors. The control and effective use of factors effective in acquisition of intended behavior bear importance in education. In educational institutions some students hold positive attitudes towards the lesson whereas some students are careless and not attempt to find solutions for problems. In the emergence of such difference among students, leading students' interest plays huge role. Motivation takes front stage in the process of teaching-learning as it adds desire to students' behaviors. Motivation determines the volume and energy level of individuals' behaviors. The vitality and continuity in a person's behaviors and the climbing level of energy indicate that s/he is a motivated individual.

Akbaba (2006) lists the principles below to ensure a high motivation of students;

- The student should not be motivated via extrinsic pressure but intrinsically motivated to shoulder his/her responsibilities.
- The tasks should meet the age and grade level of students. If the tasks are easy students can get easily bored. If it is difficult students may not finish their assignments and their motivation may lower.
- The assignments should match the contents of course.

- Students should be awarded for their attempts.
- Speaking the same language with students reinforces communication and when student is supported by the teacher, s/he shall gain elevated motivation in return.

According to Ray (1979), teachers should try their best to improve students' goals, attitudes and convictions towards learning. Motivation should not be assessed as the sole medium determining success but it should also be remembered that motivation plays vital role in a student's success. All parents and teachers want their students to learn to enjoy the lessons and courses outside. Some students enjoy having to learn but some students can avoid the learning environment. The largest source of these behaviors is motivation for student learning.

According to many studies about the motives, instincts are related to the items which are intrinsic characteristics of individuals, character and so on. According to behavioral theories motivation were interpreted as a response style increased or reduced with the awards, continued long processes. According to the cognitive theory, motives influenced of the individuals emotions, ideas and beliefs (Pintrich and Schunk, 2002). According to Pintrich motives is consisting of activities for individual's intrinsic motivation and goal is a process that implementation of this formation. The motivation is an internal process, we can not observe directly. Individuals can choose their activities and they struggled to understand the motivation levels from these activities (Pintrich and Schunk, 2002).

Motivation not only leads human behaviors but it also involves the potential effects of performed behaviors. Motivated individuals are more determined in their thoughts and acts (Yazıcı, 2009, Öztürk and Uzunkol, 2013).

Motivation is a force that directs students to study at the school. Motivation creates an effect that leads and moves the behavior as well as strengthening it. This situation suggests that motivation is an important factor on learning (Yenice, Saydam and Telli, 2012; Glynn, Aultman and Owens, 2005).

According to Akbaba (2006, p.343), motivation is to take action to do something. People's motivation levels and forms vary. A student enough motivation has difficulty learning stage. Therefore, motivation is a prerequisite for learning. Student motivation towards their subjects they are interested in is easier. When they do their homework and when they study their

exams are more highly motivated. Students how they would be motivated to become so successful. Motivation is a resource that determines the direction and severity of the student's behavior. Motive is the driving force of the movement who organisms to achieve specific purposes. Motivation is to achieve a certain objective the state of physiological, affective and cognitive empowerment (Depasque and Tricomi, 2015).

1.5.Types of Motive

Issues that attracted the interest of each student vary. Hence, the motivation of each student varies in the way of each other. In that reason we can consider classification to the motive. Motives is classified as according to basic primary and secondary; according to the continuity of state and trait; according to the source internally and externally (Açıkgöz, 2005, p.208-210).

1.5.1. Primary and Secondary Motives

The primary motives are based on the basic biological urge. This motive is available in all living things. Hunger, thirst, sexual desire may be examples of the primary motive. Secondary motive is based on social and psychology. They are compassion, social approval, along with the desire, success, motivation and self-discovery (Akbaba, 2006, p.344).

Social motives are learned motives. Social motives are closely related to the concepts of power, success, fear of success, belonging, security, and status. These rules provide the layout and the continuity of social life. These rules also provides habits of behavior in human life (Tatyana, et all, 2015).

1.5.2. State and Trait Motives

State incentives arise under the influence of a given situation is temporary. A student working for the exam is given as an example of trait motivation. Students working to learn are given as an example of state motives. Situational motivation is temporary continuity motives are more permanent (Akbaba, 2006, p.344)

1.5.3. Intrinsic and Extrinsic Motives:

Intrinsic motivation can be defined as the person's doing something for himself/herself. Some researchers argue that biological and physiological basis of motivation resources. These resources can be divided into two groups depending on the structure. One of the groups elements are hunger, thirst, sleep, avoidance of pain, or to stay away from physical danger and

sexuality. The other group elements are curious, changing the environment and the desire to be active (DePasquen and Tricami, 2015, p.177).

Motivation is internal in most people's eyes. Individuals feel the urge to do a job. However people are affected outside experiences. In other words, motivation is affected by external factors. These factors are such as rewards, recognition, incentive, promotion and praise (Bruce, 2011, p. 72)

Extrinsic motives occur with such as requests reward and punishment. Intrinsic motivation occurs with interest, requirements and venue. Extrinsic motivation includes influences from the outside of the individual. The intrinsic motivations are inherent in response to the needs of the individual. They are curiosity, need to know, not enough demand, growth desire (Akbaba, 2006, p. 344).

1.6. Motivation Theories

There are several theories explaining to Motivation. Behavioral, Social Learning, Humanistic and Cognitive Approaches explain the motivation.

1.6.1. Behavioral Theories

Behaviorists have done studies on animals observable and measurable behavior and explained how motivation affects learning. Behavioral theorists examine observable behaviors. According to the behavioral theorists learning is based on the link between stimulus-response. According to them, the observed change in behavior of the organism occurs when learning takes place. These changes occur with the principle of are classical conditioning, operant conditioning, and observational learning (Turabik and Başkan, 2015).

Classical Conditioning: to give emotional and physiological responses against warner.
Operant Conditioning: Emerging changes from behavioral results.
Observational Learning: learning by observing the lives of others.

According to behavioral theorists, behavior is controlled by the environment. In learning-teaching process, reinforment, puanishment and awards were come to the fore. It is important to create the appropriate environment in the learning activities (Açıkgöz, 2005). Behavioral

psychologists have developed concepts such as “reinforcement”, “criminal” and “sampling” to describe learning.

Behavioral approaches can explain the motivation of the external reasons such as their base to learn the external effects. According to behavioral approaches, the motivation of the students can increase with beautiful words, grades or awards (Petri, 1996). External motivation has a negative impact on the students. Students may deviate from their objectives because of this approach. They can focus on the prize and it damage the motivation (Akbaba, 2006, p. 355).

1.6.2. Humanistic Theories

Humanistic psychologists emphasize the importance of intrinsic motivation. In a majority of the humanistic theorists the role of the requirements is very important. According to Maslow, there are requirements on the basis of the motivation of individuals (Ticu, 2013, p.927).Humanists believe that people should work as a whole. Acording to the humanistic theorists, people represent as a whole with experience, special interests, motivation and environment (Şahin, 2005, p.51). According to Stewart (2003) and Sturt (2004), humanistic approach was put principles into the training program.

- Intended to train the fully independent individual.
- There is no coercion and directive, there is attention and respect.
- Students are encouraged to be active
- Students learn best what they want and what they need to learn.
- Instruction should be based on students’ interests, abilities and needs.
- Rules, resources, and applications should identify the student.
- Feelings are as important as facts.

The humanistic approach is considered the human in the mental, emotional and social factors as a whole. It examines how examine these factors affect learning and to motivation. There is a need for providing them motivation of individuals on the basis of this approach. Each student has been motivated by this approach. This approach recommends a student-centered education. At this time according to this approach teacher should act autonomously without depending on the program (Akbaba, 2006, p.356).

1.6.2.1. The Theory of Hierarchy of Needs

One of the forerunners of Humanist Psychology, Maslow claimed in his researches that in order for each individual to self-actualize him/herself, that person is expected to possess the kind of motives directed to unveil one's top-level potential. Yücel and Gülveren (2007, p.72) argue that these motives lead any person towards particular behaviors. If that person receives positive results from particular behavior, the same behavior is reenacted when the same situation arises. If the result is negative or in other terms the effects on the individual are adverse, the person avoids particular behavior.

Maslow (1943) reports that the Theory of Hierarchy of Needs demonstrates an individual's stages of development and the way how motivated behaviors are unveiled. Maslow defines individuals as human beings who are constantly in need of self-improvement. Until the moment their needs are satisfied individuals shall, at all times, feel themselves unsatisfied. Maslow grouped such human needs in a hierarchic order from the basic to the top stage. Maslow ordered the motives as per their rank of significance in this hierarchy level and claimed that once needs at the bottom stages are satisfied, people then can attempt to fulfill their motives in a higher step. As illustrated in Figure 1, the peak level one can reach is the stage of self-actualization.

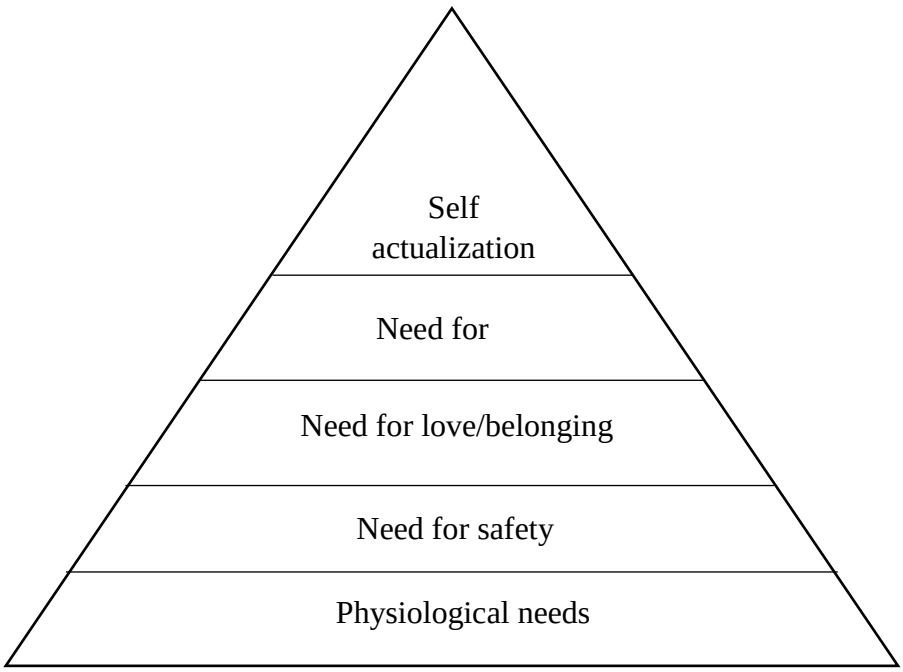

Figure 1. Maslows' Hierarchical levels of the motives.

Maslow (1943) stated that;

Physiological needs: Food, drink, sex, sleep and air need which are relatively independent from each other.

Safety needs: Protection from elements, security, order, law, stability, freedom from fear.

Love and belongingness needs: Friendship, intimacy, affection and love- from work group, family, friends, romantic relationships.

Esteem needs: achievement, mastery, independence, status, dominance, prestige, self-respect, respect from others.

Self-actualization: realizing personal potential, self-fulfillment, seeking personal growth and peak experiences.

1.6.3. Cognitive Theories

Cognitive approach has emerged as a response to behavioral approach. This approach reverse the behavioral approach allows the intrinsic motivation. Cognitive approach gives students the importance of individual characteristics. It is important to know the students of the work style by the teachers. Curiosity to know, getting feedback, effort, and reach the goal of intrinsic properties, such as the need for achievement, emphasized that the most important elements of motivation (Akbaba, 2006, p. 355).

According to cognitive scientists has been believed that behaviours do not shaped by reward or punishment. Cognitive scientists have been maintained that human behaviors emerged with plans, objectives, expectations and schemas (Woolfolk, Hoy and Mc-Cune, 1980).

1.6.4. Social Learning Theories

According to social learning theorists, there are three basic elements that affect motivation. These are the expectation of achieving the purpose of these individuals, the purpose for the individual and the individual's work is an emotional response to the value (Ticu, 2013, p.927)

Social learning theories defend through the model of learning together with internal and external processes. Individuals are affected by external stimuli and guided by internal effects.

According to Social learning theorists, there are three basic elements affecting the motivation.

1. Individuals for the purpose of achieving expectations,
2. the value of the purpose for the individual,
3. Individual responses will be made (Bulut, 2006, p. 19).

It has been proposed different theoretical approaches to the understanding of the importance of the motivation. The level of motivation can be determined with oral expression, making the choice between targets and goal-oriented behavior indirectly from observable sequences of actions in the learning process. It can be said that motivation strategies are the components of motivational beliefs of people. From this perspective, these components can give clues about the nature of the motivation of people. These structures are seen directly related to academic motivation (Tahiroğlu, Çakır, 2014, p.32).

1.7. Achievement Motivation

Many theories have been developed on the subject of motivation. Some of these are Behavioral, Humanistic, Social Learning and Achievement Motivation Theory. In this study, the theory of achievement motivation, which is a positive effect on learning, was examined.

Achievement motivation is the essence of expectancy-value theory. Achievement motivation theory has drawn attention to the needs of Murray classification. Then it is classified by systematized by Atkinson. High hope of success with low fear of failure the achievement motivation will be high. The opposite low hope of success with high fear of failure the achievement motivation will be low (Açıkgöz, 2003, p.234).

Expectancy-value theory takes over expectations as a motivational factor. According to this theory, motivation was determined expectations regarding the behavior of individuals and their behavior to the given value. The level of motivation may affect the possibility of performing the behavior. A high probability of realization, a weak the given value for behavior can increase the individual's motivation (Brophy, 1999). This explanations focus on the expectations of individuals. However there are not only students within the scope of the objectives to be achieved in educational activities.

Table 1.

Differences between those with High Motivation for Achievement and Low Motivation for Achievement

High	Low
Learn for the sake of learning	Appear to have learnt
Set medium hard goals	Set quite easy or hard goals
Have sophisticated feelings of competency	Have low feelings of competency
Place value to struggling	Place value to extrinsic factors
Try to overcome challenges	Feel intimidated in the face of challenges

Note: From Açıkgöz, K., Ü. (2003).Etkili Öğrenme ve Öğretme. İzmir: Eğitim Dünyası Yayınları., p.208

Fear of failure and avoidance of failure is the negative aspect of achievement motivation. Be successful and avoid failure located on different levels of people. If a person's achievement needs are more than higher of avoidance of failure, that person will try to take into account all the risks of achievement (Fidan, 1986, p112).

Achievement motivation is defined as, and a tendency or a request to make them as good as you can as quickly as possible (Soyer, Sarı and Talaghir; 2014, Yusuf, 2011). In many researches it is stated that individuals want to overcome obstacles, to obtain a high standard for themselves, to be dominant to the others and to develop their skills. Therefore it is very clear that the success is a motivation (Mala and Veresova, 2014, p.1959).

Teachers, taking into account the achievement motivation of students to recognize their students on an individual basis and taking into account the need to organize their teaching potential. In addition, those with the lowest high achievement motivation would be appropriate not to apply the same teaching strategies. Students' behaviors are given below with high and low achievement motivation. Teachers should make teaching considering them (Fidan, 1986, p.112).

High achievement motivation student behavior;

- They deal with difficult problems better and tastefully
- They want to give feedbacks from time to time
- Details of a grading system with a certain precision and is more appropriate
- They prefer new and unexpected problems.
- Not afraid of failure

Low achievement motivation student behavior;

- They prefer problems and assignments in the middle challenges.
- They usually wait for reinforcement and feedback.
- They adopted a tolerant note system.
- They work in small steps.
- They avoid heard their mistakes by others.

Successful students see the talent and effort as the cause of their success. They tend to see the lack of effort as a cause of failure. High achievement students are motivated in failure. Low achievement students are motivated in success (Açıkgöz, 2005, p.234).

Motivation, can originate from several sources such as curiosity, competition, or self efficacy beliefs. Atkinson mentions three factors that determine the behaviors. These are (Umay, 2002, p. 148- 149);

- The result of the conflict between hope of success and fear of failure depends on the power of success and failure.
- Successful people with motivation at a high level uses complex cognitive strategies. They like a challenging task and rush into the middle of the event in order to control the task.
- Our impulses depend on how attractive the results are in our life.

McClelland and Atkinson have made detailed studies on achievement motivation theory. According to them, people just don't want to get the reward of success, they also want the success due to the need (Mala and Ceresnik, 2013, p.3027). According to McClelland, people seek out pleasant emotions and situations. The stimuli that occur in conjunction with these

nice feelings combined with an emotional situation, that person urges to nice situation (Mala and Veresova, 2012, p.1961)

Teachers should be made activities in the classroom knowing the student's level of achievement motivation. Students with high achievement motivation they enjoy doing challenging exercises. The students with low achievement motivation get the taste of being successful moderate degree of difficulty in dealing with questions of the research (Açıkgöz, 2005, p. 236).

Success needs consists of many factors, such as to win the respect of al, approved experts, save money, and the desire to achieve on its own. We use these factors when defining successful people. Achievement motivation, beyond the expectation of success or achievement needs is something much more complex. Motive may arise from natural sources such as competition and self-efficacy beliefs (Umay, 2002, p.149). According to Atkinson, success is the result of the tendency to the following substances (Clayton, 2004);

- Motivation for the success of the individual,
- The success of the individual expectations,
- Value to the success of the individual.

As a result, According to Tahiroğlu and Çakır (2014, p.31), it is observed that motivation is one of the preconditions necessary for learning. Students often learn in less time the objects they are interested in. It can be said that when students are motivated, they pay more attention to the lessons, they work for doing their homework and exams. It means that a student is unmotivated enough are not ready to learn (Akbaba, 2006, p.344)

1.7.1. Factors Affecting the Achievement Motive

There are many factors that affect the success of student motivation. Some of these factors are teacher effectiveness, friends, people's attitude towards school, perceptions, past experience and parents.

Teacher effect: If teachers are willing, students are motivated more easily. Teachers should make notification to create positive emotions. Their impact on students' motivation level is greater.

Circle of friends: Friends form the students' social environment. Students loved by friends are more motivated the courses easily. Students can be cooled lessons from not the acceptance by friends.

School: Activities in the school must meet the social and intellectual needs of the student. The student must be provided to come willingly to school. If students' achievement motivation will be high if school provides satisfaction in terms of mental and social.

Students' perceptions of their own: Students' perceptions of their own are their strengths and weaknesses, skills, personal characteristics and performances.

Motivating student can study efficiently. There are some suggestions to motivate individuals and to ensure the continuation of motivation (Keenan, 1996, p.5).

- Ask questions interesting, surprising and intriguing in the beginning of the lesson.
- Courses make as possible active, exploratory, the exciting and helpful.
- Make sure the students know how to go to the destination
- Take into account the individual differences in terms of attitudes to school and that some courses in intelligence, socio-economic-cultural background.
- Help students with the basic needs.
- To take into account the physical conditions of the classroom.
- To feel that you deal with them.
- Organize extracurricular and activities to meet the needs of each student's appreciation.
- Give feedback on results with highlighting positive aspects.
- To encourage the students to learn for themselves orientation.
- Use techniques, give responsibility to the students and race their own to develope for their achievement motivation.
- Emphasize students not to afraid of failure.
- Students must be channeled to the attention constantly learning materials.

People are forced to deal with various problems in daily life considering the fact that the development of problem-solving skills at the secondary level is inevitable (Baykul, 2009, p.50). As studies related to achievement motivation is examined it surfaces that achievement motivation is closely connected to problem-solving skill (Bedel and Hmarta, 2014; Dereli, Angın and Karakuş, 2012). Therefore in current study a deeper analysis has been conducted on problem solving skill as well.

1.8. Problem Solving Skills

According to new elementary mathematics program, problem solving is seen as an integral part of the math courses and activities. When students feel that their solution is valued they can success in the problem solving process. According to MEB (2009) students learn to communicate with using math and to develop higher-order thinking skills is emphasized. National Council of Teachers of Mathematics, NCTM (2000) was emphasized problem-solving skills that receive priority in teaching mathematics and problem-solving approach and the teaching of mathematics subjects.

It is understood that problems when people face with difficult situation and they have not any paths to find a solution. Problem solving, is facing a series of challenges to achieve a certain goal includes efforts to eliminate (Kaptan and Korkmaz, 2002, p.189).

Mathematical problem solving taking place in the center of instructional program some of the important causes, learning in general, and in particular mathematics and mathematical understanding that affects in a positive way of thinking. Good problems were stated to be;

- arising from the student's environment
- pushing students to develop and use strategies
- preparing the environment for introducing students to new concepts (NCTM, 2000).

The teacher's role was determined as;

- select appropriate problems
- manage the use of suitable purpose
- assess students understanding and use of strategies to help them better problem solvers (NCTM, 2000)

Related research with problem-solving skills have shown that, problem-solving training increases the ability of individuals to solve the problem (Koray and Azar, 2008; Durmaz and Altun, 2014). In this case, gaining problem-solving skills from students was depended on to use effective problem-solving strategies (Arsal, 2009, s.103).

According to Mathematics Programs of Ministry Education (MEBa, 2009), the general objectives of problem solving strategies are;

- problem solving was defined as a process .
- problem-solving skills can be developed through the learning of problem solving strategies.

There are strategies in problem solving;

- To distinguish the important information in the problem
- To develop a plan solution
- To represent the problem with concrete tools, figures, diagrams.
- To use different solution strategies
- to control the solutions strategies (MEBa, 2009)

As seen the Mathematics Programs of Ministery Education (MEBa, 2009), understanding the problem, developing various solution and controlling the solutions are very important. New elementary mathematics program, problem-solving strategies were been an integral part of the maths courses, and teachers attaches importance to the development of strategies through activities in teaching mathematics.

The solution of each problem is separate from each other. There are some steps to solve math problems in many researches. According to Polya (2014), mathematics is a problem-solving activity open to students seeking. Polya also attests that mathematics is not a cumulative of ready knowledge but it is rather a problem-solving activity open to students' pursuit (Özsoy, 2005). Polya (2014), has committed mathematical problem solving in the four steps. These are;

1. understanding the problem
2. to make a plan
3. implement the plan
4. Control

The critical problem-solving behaviors were determined in many studies (Özsoy, 2005; Baykul, 1996).

Table 2.

Problem-Solving Behaviors (Özsoy, 2005, p.181)

Stages	Behaviours
Understanding the problem	a. To define the problem b. To say/ write the problem with her own words c. To draw the problem with the appropriate figure/ diagram.
Mathematical statements to solutions of problems	a. To write the math sentence. b. To predict the outcome of the problem
Making processes	Processes to be used in solving the problem
Control the solution	To compare the estimated results

In the stage of understanding the problem, the problem should be read carefully. Students should be taken to ensure that the problem situation is understood. The information given in the problem should be edited by using lists, tables or diagrams. In the stages of mathematical statements, mathematical operations must be defined and the answer to the problem should be estimated. In the stages of making process, the process is done correctly the four operations in problems. In the stages of control the solutions, the estimate of whether it is appropriate or not is to check the result.

According to Özsoy (2005, p.182), the behaviors in question constitute problem-solving skills. It was proposed that the students with above behaviour would have problem solving skills.

There are several problem solving skills (Posamentier and Krulik, 1998, p.105).
These are;

1. Working Backwards: The stage is that the solution of the problem is performed step-by-step at the beginning.
2. Finding a pattern: Students discover patterns to solve the problem.
3. Adopting a Different Point of View: Students learn new concepts.
4. Making a Drawing: Students can make visual representations.
5. Guess and Check: Students can predict the results than check the results.
6. Accounting for All Possibilities: Students try all possibilities.
7. Organizing Data: The data was organized to use time efficiently.

Dewey (1933) recommended method of solving the problem for all students is as follows;

- Become aware of strenghth and define the problem,
- To obtain and classify relevant information,
- Generate appropriate hypotheses,
- To test possible solutions,
- To verify the results and evaluate them.

According to the report of the PISA 2003 study prepared in the framework, problem solving steps to follow in the process:

- Defined in the context of the problem
- Determination of appropriate information or limitations
- Presentation of possible options or solutions
- Solving the problem
- Checking the solution
- Sharing the results is ranked (PISA, 2003).

According to Schonfeld the theory of solving the problem includes the following stages in the solution of mathematical problems; Problem analysis, the election of appropriate mathematical knowledge, make a plan, implement the plan and check the answer (Harskamp, Suhre, 2007).

Problem solving-related studies examined that there are differences in terms of problem-solving skills and styles of individuals. People who have sufficient to solve the problem, have a positive self-image, are initiative in relationships and academically successful. As a result students, who are successful in solving the problem themselves stimulated towards solving the problem.

1.9. Reflective Thinking Skill towards Problem Solving (RTSTPS)

Several theoretical explanations have been reviewed for dealing with problem solving. One of these theories is the John Dewey's reflective thinking theory. It has been recognized as a classical model for problem solving until the 1950s. It is thought to be practical, especially in the areas of science and math.

PISA underlines that at the end of problem solving process, reflective thinking is conducted on the problem and as a component of this process reflective thinking skill towards problem solving bears importance (PISA, 2003). Based on this assumption developing, assessing and measuring reflective thinking skills take the stage as important topics of research.

The ability to think is very important; this is regarded as the feature that distinguishes human beings from animals. However, it is important is because the usual vague ideas about the why and how of thinking is ambiguous, containing the values of reflective thinking is important. Dewey suggested that reflection has the five stages. These stages do not have to be in a particular order but must be compatible with each other. These five stages are suggestions, problems, hypotheses, reasoning, and testing (Dewey, 1993, cited Petek and Aşkar, 2009, p. 84).

Suggestions: The individual are confusing when faced with a situation that appear in the mind ideas and possibilities. Suggestions increase the need to stop and think. Suggestions are the energy source of the subsequent questioning.

Problems, instead of facing the small details in a confusing situation as parts of the whole, it is to see the bigger picture.

Hypothesis, is to what can be done with due consideration of the recommendations. working on Hypothesis involves to make more observation and thinking over the information. Thus, the problem was purified, refined, and recommendations is transformed in testable and measurable.

Reasoning, is to provide to test ideas, suggestions and hypotheses pieced together knowledge and previous experiences.

Testing, can bring clarity to existing problems.

The stages of Dewey's reflective thinking, is similar to the process of problem solving and has been a model. As the stages of problem solving was developed by the researchers.

According to Dewey (1933, quot. Petek and Aşkar, 2009) features that must be present in person are open-mindedness, willingness and full of responsibility.

Open-mindedness, the ability to look different and new ways to the problem. Open-mindedness requires being an active listener and readying to hear the different sides.

Full willingness, occurs when being involved with a subject matter. It is connected with experiencing a lot of ideas and thoughts.

Responsibilities are to take the results of person's activities.

Schön (1987) was defined the reflection in two ways which are reflection-on-action and reflection-in-action. Reflection-in-action focuses on problem solving when the action is being performed. It is the process of containing the rearrangement of action. Reflection-on-action evaluates every aspect of the action after the action has been performed. It allows to look back and think about the action.

As a result, to be a good problem solver in business and everyday life provides great advantages. Students gain success in the problem solving process, increase their motivation for mathematics (Demirel, Derman and Karagedik, 2015).

1.10. Related Researches

In this section, firstly various publications and research in the world and in our country will be discussed related to achievement motivation towards mathematics, then the various publications and research about reflective thinking skill towards problem solving in our country and the world will be discussed.

1.10.1. Researchers Related To Math Achievement Motivation (MAM)

Green (1995) has studied the effects of gender, job type and job status on achievement motivation. 264 people have been involved in the research. The data were collected with Work and Family Cohesion Scale developed by Spence and Helmreich in the study. In the analysis of the data used multi-analysis of variance. It was revealed that achievement motivation of teachers was higher than of other professions (lawyer, doctor, etc.) and achievement motive of females was higher than achievement motive of males.

Salili (1996) examined the effect of achievement motivation on age, gender and cultural differences. 764 British and Chinese students participated in this research. At the end of the research, the levels of achievement motivation of Chinese students were found to be higher.
Miller (2000) has examined the effect of mathematics courses at the university and students' mathematics motivation. At the end of the interviews with students this study has shown that there is agglomeration on mathematics anxiety, profession, and responsibilities of class or family. According to the findings for the understanding of motivation was not a prerequisite, but it was observed that understanding the math increases motivation of student.

Gottfried (2001) was made a long-term experimental study to determine a direct relationship between children's academic intrinsic motivation and academic achievement. There was a positive relationship between motivation and academic achievement. Children with higher intrinsic motivation have demonstrated high academic achievement and they are more active in school activities. Gottfried also has found a positive relationship between the motives of younger age's children and the motives of later age's children.

Umay (2002) was investigated the achievement motive level of mathematics teacher candidates. The achievement motive scale was developed by the researcher. Since 1998 the scale has been applied to the new beginning of elementary mathematics education students in Hacettepe University. The final measurements were taken by applying the same students again in 2002. There was appeared to be a significant difference between the preliminary and final measurements. However there have been revealed no significant difference the achievement motive score of new beginning elementary mathematics education students according to the years.

Broussard (2002) have investigated the relationship between motivation and academic achievement in first and third graders. Number of first graders was 122 and number of third graders was 129. Broussard has found a relationship between the high notes and the high level of motivation. It has been concluded that girls' extrinsic motivation higher than men' extrinsic motivation.

Altınok (2004) has examined the relationship between achievement motivation and science achievement of fifth grade students according to the gender. 1042 fifth graders was participated in this research. In this research the data were collected with the achievement motivation scale. Science achievement of students was determined according to their grades of previous semester. The findings have revealed that there is a high correlation between the motive and the success of science. As a result, students ' level of achievement motivation has been medium. Also it was indicated that motive level of female students was higher than male students.

Bulut (2006) was investigated learning strategy and achievement motive of secondary school students in mathematics. 703 seventh class students have been involved in research. As a

result, the researcher has revealed that students had a middle achievement motive. It has revealed low achievement motive level decreases the using learning strategy.

Erdoğan, Kesici and Şahin (2011) was investigated the prediction of high school students' mathematics anxiety by their achievement motivation and social comparison. 166 9th grade students have been involved in research. It was revealed that achievement motivation alone, and achievement motivation and social comparison together are significant predictors of high school students' mathematics anxiety.

Tuncer and Ozeren (2012) evaluated prospective teachers in terms of their use of reflective thinking skills to solve problems. Fort this aim authors has been researched to determine whether there is a significant difference with respect to their gender, departments and classes. The study population is prospective teachers who attend the Education Faculty of Fırat University. It was revealed that there was a significant difference in the class variable.

Yusuf (2011) was investigated the impact of self-efficacy, achievement motivation, and self-regulated learning strategies on students' academic achievement. Selected undergraduate students participated in the study. It was determined that it has the effects of self-efficacy beliefs, achievement motivation, and self learning strategies on academic achievement.

Kim and Chung (2012), was investigated the role of family orientation in predicting Korean boy's and girl's achievement motivation to learn mathematics. It was revealed that the relationships between students' perceptions of parent variables and their achievement motivations statistically varied across gender. In addition both Korean boys' and girls' family orientation mediated between their perceptions of parent variables and their own achievement motivations.

Gnitetskaya, Ivanova and Kovalchuk (2015) was investigated the problem of motivating first-year students to study a complicated material of physics. The results prompted the recommendations on forming the composition of competing teams in high schools and universities.

1.10.2. Researches Related To Reflective Thinking Skills towards Problem Solving (RTSTPS)

Bereby, Meyer and Kaplan (2005) were investigated the effect of achievement goals on the transfer of a problem-solving strategy in 7- and 11-year-old children. In the first experiment, motivational priming took place before the learning of the strategy, affecting the learning as well as the transfer of the strategy. In the second experiment, motivational priming took place after the learning of the strategy and before the transfer task, affecting only the process of transfer. Participants' self-reported achievement goals suggested that, in both experiments, participants high on performance-approach goals were less likely to transfer the strategy than participants low in performance-approach goals.

Tok (2008) studied the effects of reflective thinking activities of 5th graders in science classes on academic achievement and attitude. The sample consists of 62 fifth graders attending a state elementary school in the centre district of Hatay in Turkey. Research was carried out on two groups of experimental and a control group. Reflective thinking activities were applied to the experimental group. In conclusion reflective thinking activities increase students' academic achievement in science course. In addition this results reflective thinking activities affect positively students' attitudes towards science course.

Karasel, Ayda and Tezel (2010) was investigated the relationship between mathematics anxiety and mathematical problem solving skills among primary school students. The study group consists of 134 students studying in 9 different primary schools in the Turkish Republic of North Cyprus between 2009-2010 academic years. In this study there is a minor significant difference ($r=0.28$; $p=0.01$) between the relationship of students anxiety and problem solving skills

Yavuz, Arslan and Gülten (2010) determined whether there are differences in prospective mathematics and social science teachers' perceived problem solving skills with respect to their department. The participants of the study were in the fall of 2009 academic year at Istanbul University in Turkey. The result of the study was that problem solving skill levels of prospective teachers are below the average, the skills do not differ according to their departments and senior prospective teachers' problem solving skills are higher than the freshman prospective teachers. In addition female prospective teachers have higher problem

solving skills than male prospective teachers and the ones studying regularly to courses also have higher skills than the ones studying before the exam.

Özdoğan, Seyitoğlu and Güven (2011) examined that the change over the years of problem solving skills of pre-service elementary mathematics teachers. The participants consisted of 1st, 2nd, 3rd and 4th class of pre-service teachers in Elementary Mathematics Teacher Education Program in Karadeniz Technical University. It is revealed that problem solving oriented lessons should be heightened so as to improve problem solving skills of pre-service elementary mathematics teachers.

Tuncer and Ozeren (2012) examined evaluation of prospective teachers in terms of their use of reflective thinking skills to solve problems. This sample consists of prospective teachers who attend the Education Faculty of Fırat University. 113 students were in the second class, 87 students in the third and 29 students were in the fourth class. The study was conducted according to survey model. It has been found that there was a significant difference in the class variable.

Baki, Güç and Özmen (2012) were conducted a study on reflective thinking to problem solving.. The aim of this study is to determine the pre-service elementary math teachers' reflective thinking to problem solving. The sample consists of 10 elementary pre-service math teachers at the third year of their four-year mathematics teacher graduate program. In results g-has showed that the pre-service teachers were focused heavily on solving the problem in the shortest way possible during the problem solving process.

Özgür, Temel and Yılmaz (2012) were examined the effect of learning styles of pre-service chemistry teachers on their perceptions of problem solving skills and problem solving achievements. The participants were the pre-service chemistry teachers of Hacettepe University Faculty of Education, Department of Chemistry Education. It was revealed that there is a significant relationship between problem solving achievements and learning styles of preservice chemistry teachers.

Baş and Kıvılcım (2013) were examined the correlation between high school students' reflective thinking skills towards problem solving and their academic success in mathematics and geometry courses. The sample consisted of 410 High School students. There was a

significant high correlation between students' reflective thinking skills towards problem solving and their academic success in mathematics and geometry courses. In addition of this result students' reflective thinking skills towards problem solving predicted students' their academic success in mathematics and geometry courses significantly.

1.11. The Purpose and Significance of the Research

Math is a common thinking tool of people. People, who have gained mathematical thinking skills, would succeed in solving all kinds of problems. Mathematical thinking and problem solving skills not only in the areas of finance and engineering that can use in everyday life (Capriora, 2015; Dostal, 2015). Solving the problem is one of the main objectives of mathmeatics education. Therefore to enable and develop problem solving skils are very important in mathematics education. In each country attaches importance to mathematics education to raise individuals who are able to find the right solutions and right thinking. As shown by the results of pisa2012 and TIMSS-2011, success of mathematics in our country is low (MEB, 2013; Büyüköztürk, Çakan and Tan, 2014).

One other characteristic that is required for student success is motivation. Research offers some evidence that motivation have important effects on student achievement (Erdoğan, Kesici and Şahin, 2011). Students must want to learn and give attention to learn something. They must be driven for it.

The overall purpose of this study presented as to investigate MAM and RTSTPS scores levels of the 8^{th} grade students towards mathematic. For this purpose, the contents of the mathematics curriculum, the nature of Mathematics, mathematics learning processes, MAM and RTSTPS within the scope of this thesis was discussed. In this direction, research problem statement and sub-problems is structured in the following way.

1.12. Research Questions

The problem being addressed in this study is "What are the relationships between math achievement motivations and reflective thinking skills towards problem solving of the 8^{th} grade students?"

Sub-problem1: What are the Achievement Motivation Scale scores levels of the 8^{th} grade students?

Sub-problem2: What are the Reflective Thinking Skills towards Problem Solving Scale scores levels of the 8th grade students?

Sub-problem3: Is there any relationship between students' Achievement Motivation Scale scores and Reflective Thinking Skill towards Problem Solving Scale scores?

1.13. Assumptions of The Study

The research is based on the following proposition;

- It was assumed that all participants provided honest and accurate information during the scales.

1.14. Definitions

Achievement Motivation: "Achievement motivation is the desire, need and expectation for success" (Umay, 2002a, p.149).

Reflective thinking of problem solving: "Questioning, making assessments and analyzing cause-effect relation are the actions utilized in the detection of reflective-thinking skills towards problem solving" (Aşkar & Kızılkaya, 2009, p. 87).

2. METHOD

This chapter presents information about the whole methods and procedures that were taken in this study. This section involves information about research design, sampling, variables, quantitative data analyses, measuring instruments, assumptions, limitations of the study and external threat of the study.

2.1. Design of the Study

In this study has been used the descriptive quantitative research method. The main purpose of this research was to investigate the relationship among the eight grade students' MAM and RTSTPS in Istanbul. In order to investigate the research questions, quantitative research method was used. To look up main and joint effect of variables, data were examined through general statistics. In addition, the correlational research design was chosen in order to investigate the strength of the relationships among MAM and RTSTPS.

2.2. Study Group

Participants of this study were selected from students from three regions of İstanbul Anatolian side. There were 335 public and 44 private elementary schools in the Anatolian side of İstanbul (Minister of National Education-MoNE, 2010). Since the target population was too large, it was hard to reach all eight grade students at 379 elementary schools in İstanbul, also it required more time and more financial resources. Therefore, the accessible population, where the results of the study will be generalized, was determined as all the eighth grade students at 2 public and 2 private elementary schools in different district of the Anatolian side of İstanbul (MoNE, 2010).

Table3.

Demographic characteristics of the sample

	f	%
Gender		
Female	212	46
Male	249	54
Total	461	100,0
Schools		
Kazım Karabekir İÖO	173	37,5
Celal Yardımcı İÖO	169	36,7
İstek Vakfı Okulları	72	15,6
Kalem Vakfı Okulları	47	10,2
Total	461	100,0
Levels Of Mother's Education		
Illeterate	12	2,6
Literate	18	3,9
Elementary Graduates	92	20,0
Secondary Graduates	99	21,5
High-School Graduates	125	27,1
University Graduates	110	23,9
Total	456	98,9
Levels of Father's Education		
Illeterate	16	3,5
Literate	21	4,6
Elementarty Graduates	62	13,4
Secondary Graduates	97	21,0
High-School Graduates	116	25,2
University Graduates	142	30,8
Total	454	98,5
Working Mother		
Yes	158	34,3
No	302	65,5
Total	460	99,8
Working Father		
Yes	424	92,0
No	33	7,2
Total	457	99,1
Teachers' Gender		
Female	321	69,6
Male	140	30,4
Total	461	100,0
Having Preschool Education		
Yes	315	68,3
No	145	31,5
Total	460	99,8

Table 3 shows the descriptive statistics of the eigth grade students participated in study with respect to school type, gender, teachers' gender, education level of mother, education level of father, level of family income, having preschool education and supporting from mathematics. 342 (74, 2%) participants were from 2 public elementary school and 119 (25,8 %) were from 2 private elementary schools. Moreover, males participants of the study were a few more than female participants of the study. For instance, 212 (46 %) female and 249 (54%) male students were participated in this study.

As seen in Table 3, 12 (2,6%) of the students' mothers were illiterate. 92(20%) of the participants indicated that their mother graduated from elementary school whereas 62(13,4%) of the subjects stated that their father graduated from elementary school. 99(21,5%) of the participants stated that their mother graduated from a middle school and 97(21%) students indicated that their father graduated from middle school. Students stated that 125(27,1%) of the mothers were graduated from high school and 116(25,2%) of the fathers were graduated from a high school. 110(23,9%) of the subjects stated educational level of their mother as university and 142(30,8%) of the subjects' fathers were a graduate.

158 (34.3 %) of the students mothers are working and 302 (65,5%) of them indicated that students' mother are not working.

424 (92 %) of the students fathers are working and 33(7,2 %) of them indicated that students' fathers are not working.

As given in Table 3, 315 (68,3%) of the students indicated that they have pre-school education. 145 (31,5 %) of the students specified that they do not have pre-school education. 1 (.2 %) of the students did not indicate any answer.

2.3. Instruments

As it was mentioned before, the main purpose of this research was to investigate the relationships among eighth grade students' achievement motivations and reflective thinking skills towards problem solving. In this study there are three measuring instruments, which are; socio-demographic characteristics form, achievement motivatation scale (AMS) and reflective thinking skills towards problem solving (RTSTPS) scale. In this section, they will be explained in detail.

2.3.1. Socio-Demographic Characteristics Form

In order to better understand the properties of the group, personal information form has been prepared. Socio-demographic characteristics included information about students such as gender, type of schools, mothers' education level, fathers' education level, teachers' gender, having pre-school education, having support from extra courses information about the educational level and income of parents.

2.3.2. Achievement Motivation Scale (AMS)

The main subject of this research is to examine the place of students' achievement motivations in the learning of mathematics. For this purpose, the scales were examined and the relevant type completed. Achievement motivation is an expectation, a need and a request for success (Umay, 2002c). AMS, used to measure eighth grade students' achievement motivations towards mathematics in this study was developed by Umay (2002,a). This scale consists of two parts. First part consists of seven items. The second part consists of 14 items that are rated triple. Scoring has been designed according to the responses of the student considering the frequency of the performing of the action in that question. Action frequencies have been organized in the levels of "Always", "Sometimes", and "Never". These levels have been scored as Always = 3, Sometimes = 2 and Never = 1. Accordingly, Scores were added across items to form a possible total score ranging from 14 (low achievement motivation) to 52 (high achievement motivation) for each participants. Umay (2002a) measured reliability coefficient of scale as Cronbach alpha value 0,75 on the basis of second part. For present study, the result of the Cronbach Alpfa analysis indicated a coefficient of 0.67.

2.3.3. Reflective Thinking Skills Towards Problem Solving Scale (RTSTPS)

Problem solving skills are one of the mental skills used by most of the individuals both in everyday life and in the academic field. Investigation of students' awareness about the problem solving process is among the objectives of this research. A preliminary study of the scale, actions that are performed in the process of reflective thinking in three main points are discussed. These are questioning, causes and evaluation (Dewey, 1933 cited by Kızılkaya, 2009). Questioning the process of searching to answer the questions of the person. Assessment is to turn into action again. Reasoning is investigating cause-and-effect relationships. Ingredients are intended for a math lesson by considering the stages of solving the problem. RTSTPS scale was developed by Kızılkaya (2009). Scale items were intended for a math lesson. The scale consists of 14 items. Scale items were graded 5-point Likert type.

The options are like “always”, “often”, “Sometimes”, “Rarely”, and “never”. These levels were highest with followed by always=5, often=4, sometimes=3, rarely=2, never=1. Of this scale prepared by Kızılkaya (2009) KMO value was found as “0.872” and Bartlett’s Test of Sphericity value as 1084.329 ($p< 0.01$).

In this research 461 students from 8^{th} grade were analyzed and it was found out that Cronbach alphas reliability coefficient of RTSTPS was 0,89.

Table 4.

Characteristics of Measurement Tools

Measurement Tools	Item Number	Item Type	Coding	Range
AMS	14	3-point Likert	1-3	14-52
RTSTPS	14	5-point Likert	1-5	14-70

2.4. Data Collection

Upon receiving an approval from İstanbul Provincial Directorate for National Education a receipt of permission was granted hence in December 2014-2015 academic term data collection procedure was initiated.

In the detecting implementation hours, research data were collected during lesson hours. The scales were implemented by the researcher in one class hour (45 minutes) for each. Data collection stages were as follows:

1. The administrators of schools in this sampling were briefed about research topic, the contents of scales and the implementation process. To ensure that implementation process continued coordinately with teaching process the researcher followed the dates and hours notified as to be appropriate by the school principal.
2. The schools were visited in the specific dates and hours. The researcher attended the classes with classroom teacher. To ensure that students answered the scales truthfully they were briefed about the objective and importance of research. Next they were explained how to respond the scale questions and students’ inquiries were answered.
3. Prior to implementation stage class teacher was notified about the method of implementation.
4. The implementation in the presence of researcher and teacher led the students to answer the scales more attentively and respond to scale items without being affected from one another.

5. To ensure that students express their thought freely and truly they were not asked to write names on the forms.
6. At the end of implementation process, students shared their ideas about the mathematics course with the researcher and expressed their contentment to be involved in this project.

2.5. Data Analyses

All the statistical analyses were done by using the Statistical Package for Social Sciences 21 (SPSS 21). The significance level was set $p<.01$ unless otherwise indicated. Frequencies and percentages of the demographic variables of the sample were displayed.

For data analysis, statistical techniques were employed and the specific places where each were used have been detailed given below.

This study employed these statistical calculations in measuring Math Achievement Motivation (MAM) and Reflective Thinking Skills Towards Problem Solving (RTSTPS) of the 8^{th} grade students;

1. Descriptive Statistics
    a. Arithmetic means
    b. Standard Deviation
2. Correlation

Manipulation of the variables not implemented. The study also includes correlational design. To examine the relationships between as variables Pearson products moment correlation was used.

3. RESULTS

In this chapter, the results of this study are explained in two sections. In the first section the results of descriptive statistics are presented. In the second section the results which related to inferential statistics are explained.

3.1. Results of the AMS and RTSTPS scale scores levels of the 8th grade students

The problem sentence of this research determined as "What are relationships between math achievement motivations (MAM) and reflective thinking skills towards problem solving (RTSTPS) of the 8th grade students? To answer this problem AMS and RTSTPS scale responses of the students are investigated separately.

3.1.1. The results related to the First Section of the AMS

Achievement Motivation Scale consists of two parts. In the first section have questions about the achievement motivation. Means, standard deviations, frequency and percentages of the students' answers to the first section were presented in Table 5.

Table 5.

Descriptive Statistics Related To The Achievement Motivation Scale of First Section

	1		2		3		4		Mean ($\overline{X}$)	Sd
Item1	F	%	f	%	f	%	f	%		
Do you find yourself successful in mathematics? 1. Yes 2. No	258	56	200	43,4					1,43	,49

According to the data obtained from table 5, 258 (56%) of the students has found himself/herself successful in math courses. 200 (43,4%) of the students has found himself/herself unsuccessful in math courses.

Table 6.

Descriptive Statistics Related To The Achievement Motivation Scale of First Section

	1		2		3		4		Mean ($\overline{X}$)	Sd
Item 2	F	%	f	%	f	%	f	%		
What is success?	323	70,1	133	28,9					1,29	,45
1. Hanging himself										
2. Others go through										

323 (70,1%) of the students was defined the success hanging one's self. 133 (28,9%) of the students was defined the success going through others.

Table 7.

Descriptive Statistics Related To The Achievement Motivation Scale of First Section

	1		2		3		4		Mean ($\overline{X}$)	Sd
Item 3	F	%	f	%	f	%	f	%		
You will need several things to be successful in this course. What is the decisive aspects in this course? 1. Talent, skill, intelligence, luck 2. Effort, diligence, work	103	22,3	355	77					1,77	,417

103 (22,3%) of the students was participated that talent skill, intelligence, and luck is required to be successful. 355 (77%) of the students was participated that effort and work is required to be successful.

Table 8.

Descriptive Statistics Related To The Achievement Motivation Scale of First Section

	1		2		3		4		Mean ($\overline{X}$)	Sd
Item 4	F	%	f	%	f	%	f	%		
Do you work for what in this course? 1. Learn something new 2. Take good notes 3. Pass the class 4. Improve my skills	186	40,3	206	44,7	38	8,2	29	6,3	1,80	,83

186 (40,3%) of the students wanted to learn something new in mathematics. 206 (44,7%) of the students wanted to get good notes in mathematics. 38 (8,2%) of the students wanted to pass the class. 29 (6,3%) of the students wanted to improve himself/herself abilities.

Table 9.

Descriptive Statistics Related To The Achievement Motivation Scale of First Section

	1		2		3		4		Mean ($\overline{X}$)	Sd
Item 5	F	%	f	%	f	%	f	%		
For whom you have been studying? 1.For my Families and teachers 2.For me	116	25,2	343	74,4					1,74	,435

116 (25,2%) of the students was preferred for his/her parents and his/her teachers to be successful. 343 (74,4%) of the students was preferred for himself/herself to be successful.

Table 10.

Descriptive Statistics Related To The Achievement Motivation Scale of First Section

	1		2		3		4		Mean ($\overline{X}$)	Sd
Item 6	F	%	f	%	f	%	f	%		
What kind of goals you put yourself? 1. Goals that I can reach in a short time 2. Goals that I can reach in a long time 3.I do not put the targets. I study to learn	100	21,7	263	57	94	20,4			1,98	,652

100 (21,7%) of the students was set short-term goals himself/herself such as successful in exam.263 (57%) of the students was set the goals himself/herself such as pass the class. 94 (20,4%) of the students was not set the goals. They study to learn.

Table 11.

Descriptive Statistics Related To The Achievement Motivation Scale of First Section

	1		2		3		4		Mean ($\overline{X}$)	Sd
Item 7	F	%	F	%	f	%	f	%		
In this course, which is similar to most of the goals that you set? 1. Get a passing grade Is enough 2. Best note I've hoped that I could get 3. Too best note	54	11,7	195	42,3	208	45,1			2,33	,678

54 (11,7%) of the students was thought that get a passing grade. 195 (42,3%) of the students was set the goals to hope the best note. 208 (45,1%) of the students was set the goals for the best one.

3.1.2. The results related to the First Sub Problem

AMS levels of 8th grade students were investigated. The descriptive statistics of 8th grade students ' AMS scores were presented below.

Table 12.

Descriptive Statistics of 8th grade students' total AMS scores

	f	Minimum	Maximum	Midpoint	Mean	Std. Deviation	Range
Achievement Motivation Scale Scores	460	14,00	42,00	28,00	22,78	4,13	14-42

Table 12 shows that the standard deviation and the arithmetic average of the total students' achievement motivation scale score. The mean of the AMS score is ($\overline{X}$=22, 78; Sd=4,13) in this research and the midpoint of it is (28, 00 min. 14, max. 42). It was seen that students' AMS scores mean is under the midpoint of the AMS.

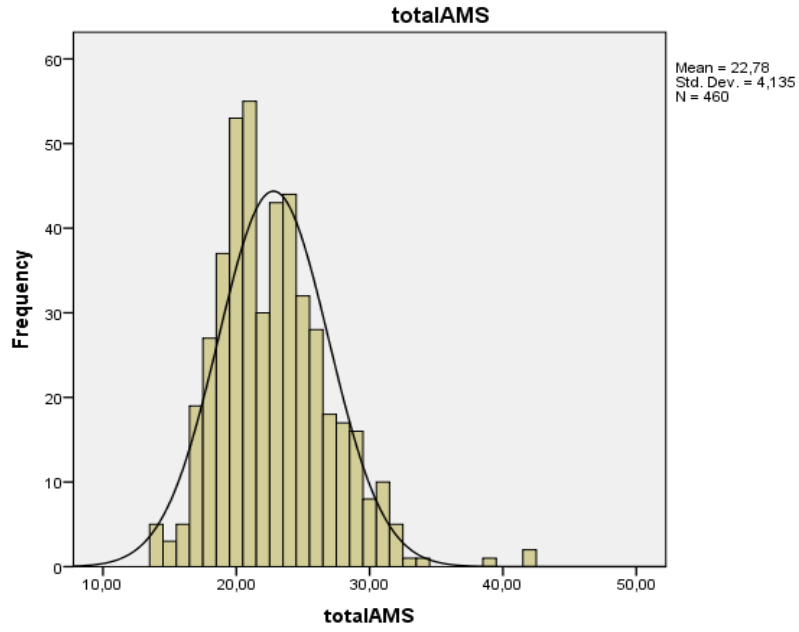

Figure 2. Histogram of mean total AMS Score for 8th grade students

It was revealed in Figure 2 that total AMS scores of 8th students were normally distributed. Despite midpoint and mean are not close the distribution were normally distributed.

3.1.3. Results related to the Second Sub Problem

Second sub-problem statement of the research is "What are the Reflective Thinking Skills towards Problem Solving scores levels of the 8th grade students?". For this purpose the levels of RTSTPS of 8th grade students were investigated. The descriptive statistics of 8th grade students' RTSTPS scores were presented in table 13.

Table 13.

Descriptive statistics of students' RTSTPS Scale

	f	Minimum	Maximum	Midpoint	Mean	Std. Deviation	Range
RTSTPS	457	14,00	70,00	47,00	33,84	11,70	14-70

According to the table 13 the mean of the RTSTPS Scale score is found ($\bar{X}$=33,84; Sd=11,70) and the midpoint of the scale is 47,00 (min. 14, max. 70). It was seen that students' RTSTPS scores mean is under the midpoint of the scale.

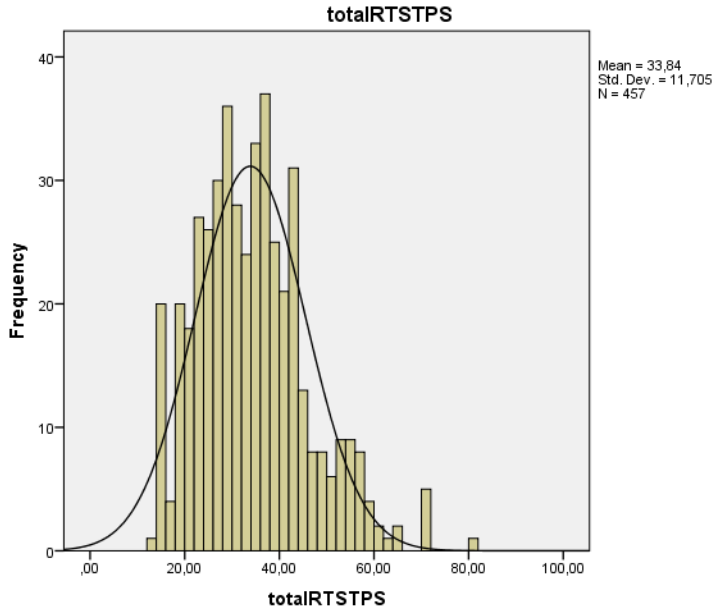

Figure 3. Histogram of mean total RTSTPS scale scores for 8th grade students

Figure 3 provided additional support for the normal distribution of 8th grade students' total RTSTPS scale scores. Thus, the normality assumption for 8th grade students' total RTSTPS scale scores was satisfied.

Table 14.

Dimensions of the RTSTPS scale scores

Dimensions	Number of Items	Mean	Standard Deviation	Midpoint	Range
Questioning	5	12,46	4,38	15	5-25
Evaluation	5	12,26	4,60	15	5-25
Reasoning	4	9,02	3,60	12	4-20
Total	14	33,84	11,70	47	14-70

The dimensions, number of items, means, midpoints, standart deviations and ranges of the RTSTPS scale was given in Table 14. The mean of the questioning factor is ($\bar{X}$=12, 46,) under the midpoint of the questioning factor 15, 00 (min.5, max.25), the mean of the evaluation factor is ($\bar{X}$=12,26) under the midpoint of the evaluation factor 20, 00 (min.5, max.25) and the mean of the reasoning factor is ($\bar{X}$ =9,02) under the midpoint of the reasoning factor 12, 00 (min.4, max.20) .

3.1.4. Results related to the Third sub problem

Third subproblem sentence of the research was defined as "Is there any relationship between students' math achievement motivation scale scores and Reflective Thinking Skills towards Problem Solving Scale scores? As a statistical technique correlation was used to answer this question.

Correlation is a statistical technique that shows at what degree two variables are related to each other. In another sense, it explains the degree of association between two variables. To investigate the relationship between students' AMS scores and RTSTPS scale scores, correlation analysis was utilized. It is used to explain the direction and the strength of the linear relationship between two variables (Pallant, 2001). There are different correlation coefficients that are used for particular situations. This problem was analyzed through Pearson product-moment correlation to see the strenght and direction of the relationship between the two variables in determined cases.

Table 15 shows the relationship levels between AMS and RTSTPS scores obtained from participant.

Table 15.

The relationship between AMS scores and RTSTPS Scale scores

		Total AMS	Total RTSTPS
Total AMS	Pearson Correlation	1	,628**
	Sig. (2-tailed)		,000
	N	460	457
Total RTSTPS	Pearson Correlation	,628**	1
	Sig. (2-tailed)	,000	
	N	457	457

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in table 15 there is a positive and significant relationship between AMS and RTSTPS Scale. The total quality of AMS scores positively and significantly correlated with the RTSTPS Scale Scores, r=.63, n=460, p<.01.

Pearson correlation coefficient (r) calculated for two variables can be defined as high (0.70-1.00), medium (0.70-0.30) and low (0.30-0.00) (Büyüköztürk, 2004). Accordingly, since there is a moderate relation between scores obtained from the scale AMS and RTSTPS can be mentioned.

4. DISCUSSIONS

This chapter deals with conclusions based on findings and reasoning about the results of the study. Furthermore; comparing those of the studies in the literature and implications and recommendations for practice and further studies are stated in this chapter.

4.1. Discussions related to first sub problem

Main purpose of this study is to explore the relationship between achievement motivation score levels and reflective thinking skills through problem solving score levels of 8th grade students. For this purpose, the first sub problem is "What are the achievement motivation scores levels of the 8th grade students?" and it was measured that students' AMS scores mean ($\overline{X}$=22, 78) is under the midpoint 28, 00 (min. 14, max. 42) of the AMS for mathematics. So as to identify elementary school students' achievement motivations towards mathematics and to determine the accompanying features on their achievement motivations, frequency and percentage distribution of the answers students gave to the first part of AMS were measured. In Table 4.1, frequency and percentage distribution of the answers students gave to the items in the first part of scale can be seen. Accordingly among 458 students 258 students (56%) considered themselves successful in mathematics course while 200 students (43,4%) considered themselves not successful in mathematic courses. This result relates to a negative situation as regards students' achievement motivation towards mathematics course. Although mathematics course of which functions are present in almost all situations in life, most students dislike the lesson (Dursun and Yüksel, 2004; İflazoğlu, 2000). There are a number of reasons explaining why students are unsuccessful in mathematics or feel themselves as a failure in this lesson. Prejudices towards mathematics course, teacher attitudes, teaching methods, lack of diligence are some of the reasons why students cannot adopt mathematics lesson (Peker and Mirasyedioğlu, 2003; Özsoy, 2005; Perker, 2005).

Demirtaş and Çınar (2004, p.105) define students' achievements as, "the progress students achieve in reaching the outcomes specified with respect to their school, classroom and course" and define failure as "The difference between a student's actual ability and school achievements".

The concept of success is perceived in different ways by individuals. According to some people, achievement is solving a problem. Another people can think that achievement is getting a passing grade from the course (Pajeres and Schunk, 2001, p.250).

The familiarity of students, teacher, parents and school administrators with the “achievement” concept can assist them in solving a number of potential problems. During this process, making sense of achievement concept and adopting this concept shall minimize communication problems. However if achievement concept is understood in different ways, certain problems will occur in reaching the targets. Provided that misleading meanings are attributed to achievement concept in this process, failure is almost inevitable (Demirtaş and Çınar, 2004).

Achievement expectation is an affective factor influential in students’ expectations. According to a research (Köse, 1998; Soydan et al. 2012, Dursun and Dede, 2004) students who attribute the reasons for their failure to modifiable factors have higher achievement expectations; however students who attribute the reasons for their failure to unchangeable intrinsic causes and unsolvable factors such as lack of ability have lower achievement expectations. Thus students’ with low achievement expectations fail to try hard. Achievement motivation is an expectation-value theory. A student’s faith and belief towards achievement bears great importance. If the student has faith towards achievement s/he exerts great effort and will to reach targets whereas a student with lower faith towards achievement fails to exert sufficient attempts.

There are also some researches indicating that compared to other factors, teachers have greater effect in a student’s academic achievement and failure (Ekici, 2014; Baştürk, 2012). Teacher is one of the educational inputs with the greatest level of interaction with students. In school environment where students spend a long span of time, their perceptions and personalities gain form and in the emergence of this formation, teachers stand out as the most significant figures. Thereby any teacher assumes vital role as a regulator of students’ school achievement and supporting students’ affective features. A teacher not only reinforces students’ cognitive skills but can also improve their affective skills such as patience, care and belief in success. In addition to teachers’ assets in cognitive dimension, their features in affective dimension are also effective in rising the quality of education.

Many students do not know very much being a successful student is dependent on which factors during the study period. In general, they associate success with only passing grades. In addition, they believe that attending class is important (Pajeres and Schunk, 2001).

Muray and Mednick (1975) in their research pointed out that talent, effort and luck are among the primary reasons in any student's state of achievement. According to this research any student's state of achievement can be explained via one or a few of these factors.

Another question in this scale is related to defining achievement. Among 456 participant students 323 students (70,1%) defined achievement as "outrunning oneself" while 133 students defined the term as (28,9%) "Outrunning others". Üredi and Üredi (2005) claims that achievement is an indicator showing the level an individual benefits from a particular lesson in the curriculum or an academic program. In our society a deep-rooted bias exists as "mathematics is a difficult lesson"; thus students work hard in mathematics lesson to receive good grades and gain prestige in society. Nonetheless this also means that students' motivation origin moves further away from intrinsic motives. Intrinsic motivation comes to surface with inner factors like curiosity ad interest which relate to inner needs of individuals whereas extrinsic motivation comes to surface with external factors such as reward and punishment which turn into incentives for individuals (Akbaba, 2006). Hence 133 students (28,9%) among the total participants of present research associated achievement with external factors because of the pressure they had faced and it is likely that they failed to form an intrinsic motivation consequently. Out of 458 students, 103 students (22,3%) defined achievement as "talent, skill, intelligence and luck" whereas 355 students (%77) described achievement as "effort, attempt and hardwork". A vast number of people do not view the problems they face in daily life as mathematical problems; hence they make wrong decisions with the misleading effects of their close associates and factors such as talent, skills and luck.

The factors affecting the success can be grouped under two main categories. These factors are individual and environmental factors. Individual factors are such as skills, values, intelligence, motivation and level of academic proficiency. Students with an appropriate environment, develop and strengthen the existing potential (Duru and Balkıs, 2015, p.123).

İflazoğlu (2000) reports that, "daily life problems can be, just as the case in solution steps of mathematical problems, solved shortcut via initially defining the data, then providing solutions on the basis of such data and finally discussing the provided solutions" (p.161). It can thus become possible to approach the results with more confident and accurate steps.

Since Mathematics is a cumulatively progressing course, it demands systematic study and students are expected to keep their efforts at high speed level all throughout the process.

Another question in this research is directed to determining the motives for studying lesson. Among 459 students 186 (40,3%) students claimed to study lesson to learn new things; 206 students (44,7%) claimed to study to get good grades and 38 students (8,2%) claimed to study lesson to pass their class and 29 students (6,3%) claimed to study to polish their skills. Once students taste achievement they feel more motivated. In an opposite situation they feel disappointed. Students who feel failed tend to avoid learning (Fidan, 1996, cited Dursun and Dede, 2004). The fact that scores received from national TEOG exams are affected by school grades students are filled with score anxiety. It should also be noted that there is a strong social pressure to get high scores (Yıldırım, 2000). Alkan (2011) in a study revealed that parents exert great pressure on students to get higher grades from exams.

As is the case in life-long learning, students with intrinsic motivation are aware of the fact that knowledge is eternal hence they pursue innovations incessantly. Students with extrinsic motivation on the other hand associate achievement with external factors for the sake of receiving social approval.

Among 459 students, 116 students studied for their parents (25,2%) and teacher; 343 students (74,4%) studied for themselves . If a person feels not in need of others' help while making decisions on topics s/he feels competent, it can be claimed that this person is intrinsically motivated. On the other hand those who make decisions as per the reward from external factors are extrinsically motivated (Elis, 2003, p.110). In that case students who study for themselves are intrinsically motivated while students who study for their parents and teacher are extrinsically motivated.

Out of 457 students, 100 students (%21,7) set short-term objectives whereas 263 students set (%57) long-term objectives. 94 students (20,4) however set no objectives but claimed to study for the mere sake of learning itself. Students opt for setting themselves long-term objectives since national exams like TEOG, SBS etc. force them to set long-term study plans. Objectives can be ensured via external motives like exam results or social esteem (Zimmermann, 1989). Students are motivated more easily so long as they can organize their objectives (Pintrich De Groot, 1990). Wolter, Yu and Pintrich (1996) conducted a research in which they analyzed the

relation between students' target-orientation & motivational beliefs and their academic achievement reflected by the grades received from English and Social Sciences courses. The findings of their research revealed that strategy of target-setting has boosting effect on students' motivation and positively predicts students' in-class achievement of mathematics, English and social sciences courses.

54 (%11,7) out of total 457 students claimed that getting a pass-grade is a sufficient objective for them in mathematics course. 195 students (%42,3) stated their objective in mathematics course as receiving the best grade they can; 208 students (%45,1) reported that their aim is to receive the highest grade in their class. Lai (2001) argues that motivation comes to surface with the factors such as willingness and persistence, which belong to affective qualities lying behind human behaviors. Intrinsic motivation surfaces with the push of personal interests and taste whilst extrinsic motivation emerges with the push of external liabilities. Intrinsically motivated students invariably set themselves short-term and achievable targets, which indicate that personal development comes first in their world. Extrinsically motivated individuals, in contrast, pay no heeds to personal development while setting targets and rather pay heed to external liabilities.

The responses students provided to the first part of scale bear value since they determine the reasons underlying students' achievement motives. Açıkgöz (2005) reports that if a person entertains high hopes of achievement and low fear of failure, s/he has high achievement motives. Provided that two feelings are at equal weight, it is detected that achievement motive is equal. When the fear is high, there is low achievement motive. At the same time, individuals with high achievement motivations set medium difficult targets whereas people with low achievement motivations are likely to set challenging targets. Consequently people who set themselves challenging targets tend to be less motivated when they experience failure.

Successful students attribute their achievement to talent and effort while unsuccessful ones associate their failure to external factors (Açıkgöz, 2005, p.22). As presented in a research (Umay, 2002; Akbaba, 2006; Baştürk, 2012) students with high achievement motivations define determinant factors of success as effort, attempt and luck while students with low achievement motives label these factors as intelligence and luck.

In mathematics course a student adequately motivated bears very small chances of failure (Umay, 2002; Açıkgöz, 2005; Yücel and Koç, 2011). Motivated individuals try their best to succeed. However those with low achievement motive tend to avoid and quit due to their fear of failure. Akbaba (2006) argues that a student's preparedness for the lesson is closely related to his/her level of motivation. Students can learn the subjects they have an interest in a shorter time and are further motivated towards the lesson. Therefore students pay attention to their assignments and study more diligently for their exams. So long as students have higher motivation they are, as observed, more successful. It is also verified in an extensive body of researches that a positive correlation exists between motivation and achievement (Tahiroğlu and Çakır, 2014).

As secondary education curriculum issued by the Ministry of National Education is analyzed it surfaces that there is lack of sufficient data on how to motivate students towards learning mathematics. In this curriculum which repeatedly emphasizes the necessity to make a connection between mathematics and daily life, there are not any concrete suggestions for the teachers on how to reflect this connection into a student's motivation process.

A student's willingness towards mathematics course is intertwined with his/her level of motivation. There are a number of criteria that the teacher can employ in order to boost students' motivation towards the lesson. To stimulate motivation assignments, in-class activities and relevant engagements should make sense for the students. On the other hand it is of common knowledge that not all students can be motivated on equal terms. A group of students are motivated with the sense of achievement while some may develop further interest towards games, puzzles, and intriguing problems and so on. Another group may develop attachment for the course once they gain an opportunity to put what they learnt into practice. These findings all together point out that based on the personal differences of students particular attention must be paid to develop their motivation towards learning mathematics (MoNEa, 2009, p. 23). In boosting students' motivation teachers' attitudes and behaviors in classroom setting may also play role. To facilitate boosting achievement motive in classroom setting, it is of vital significance to create classroom settings, in elementary and secondary level particularly, in which students can set noncompetitive and accessible objectives and get more acquainted with the fun part of mathematics. To illustrate, in an experimental study conducted by Çuha (2004) it was detected that in 6^{th} grade mathematics lesson a lesson hour

embellished with educational games significantly increased students' achievement motive scores.

As secondary education curriculum issued by the MoNE is analyzed it surfaces that, as a teaching strategy, it matters vitally for the teacher to plan a lesson on the basis of individualistic traits of the learners. In order to motivate students better, it is significant to assign those tasks appropriate to their levels and conduct engaging activities. Some students are intrinsically motivated but others are extrinsically motivated. Provided that students are given an opportunity to learn the course in line with their individualistic traits they can thus be further motivated which in effect may enable them to taste the sense of achievement.

4.2. Discussions related to the Second Sub Problem

As regards the secondary sub problem of research, "What are the Reflective Thinking Skills towards Problem Solving Scores levels of the 8th grade students?" collected responses indicate that 8th grade students' RTSTPS Scale scores are average as Sd=11.70, ($\bar{X}$ =33,84). If the average score gotten from the scale is closer to 70, this shows that the level of students' reflective thinking skills towards problem solving increases. On the other hand, if it is closer to 14.00, this means the level of students' RTSTPS decreases. When this value is compared to the lowest score to be taken from the scale (14.00), it is seen that the level of students' reflective thinking skills towards problem solving is on a low level.

Within the scope of present research three dimensions of reflective thinking have been analyzed. Francisco & Maher (2005) in their study posited that one of these dimensions, causation dimension, is related to problem solving.

Some of the sub items listed below scale items are;

- "When I fail to solve a problem I ask myself questions to understand better why I cannot solve it"
- "After solving the problem I think on my own if I could find a better solution method."
- "I try to find a better solution method by contemplating on my friends' solution methods."

These steps are parallel to the stages in reflective thinking. Reflecting on the solution of a problem is, as stipulated in OECD's PISA 2003 report, one of the steps to follow. Reflecting on solution consists of offering a list of options on problem solution and by structuring in each step holding a mirror in each subsequent stage. Dewey (1933, cited Kızılkaya, 2009) claims that reflection is by nature problem centered. Kızılkaya (2009) pointed that problem solving and reflective thinking are interrelated concepts.

The Ministry of National Education (2009) attaches remarkable value to the development of problem-solving skills in Mathematics Curriculum.
To achieve that objective, it is aimed to gain below-listed acquisitions to students:
• They utilize problem-solving to learn mathematics better.
• They develop awareness on the contribution of problem solving to learning in general.
• They can benefit from problem-solving skills in real life, in lessons or in a new problem they encounter in mathematics.
• They implement problem solving steps meaningfully.
• They can create their own problems too in addition to problem solving.
• They feel self-confident in problem solving.
• They acquire positive feelings and ideas concerning problem solving.

Problem solution is a vital skill that should be inherent in each individual. Kızılkaya (2009) concluded that reflective thinking skill has positive effects on problem solving process. Soylu and Soylu (2006) refer to the importance of problem solving in mathematics teaching and claim that to reach success in this course students should be accomplished problem solvers. While learning it is of great importance to reflect during problem-solving process, assess the knowledge gained and holding a mirror towards this process (Dewey, 1933). It is seen that when a problem arises reflective thinking skill emerges. Still a number of researches indicate that reflective thinking skill best emerges in problem solving cases (Baş, 2013; Kıvılcım and Baş 2013, Kızılkaya, 2009). In problem-solving process, next to creative and critical thinking which are among the thinking strategies, reflective thinking strategies are also utilized (Çakmak, 2000). Reflective thinking entails actions such as questioning, generalizing, making judgments, analyzing, discussing and reasoning. On that account students should plan learning processes effectively, practice the activities knowingly, move further by questioning each step, make reasoning before moving to further step and constantly hold a mirror to this process (Kıvılcım and Baş, 2013). During problem solving process particularly it is of vital

importance to complete reflective thinking stage successfully. During problem solving process creating alterative solutions and evaluating the results and relevant actions should be valued as the vital characteristics of reflective thinking process (Kızılkaya and Aşkar, 2009).

Acquiring reflective thinking, a cognitive skill, during school years and improving this skill systematically and orderly is of great importance (Baş and Kıvılcım, 2012). Reflective thinking skills enables students to construct knowledge, form cause-effect relations, make transfer across data and achieve meaningful learning. Dewey (1933) argues that in traditional education, students are led to memorize knowledge without utilizing reflective thinking skills. That is the point where the main difference between modern education which follows reflective thinking skill and traditional education becomes obvious.

The Ministry of National Education (2009) stipulates that problem solving skills entail the kind of skills students need to acquire to solve the problems they may face in real life. The entailed subskills are;

- Understanding the problem,
- Finding the substeps or roots of the problem,
- Planning to solve the problem in the best way,
- Observing the stages during operations,
- Changing of strategies and plans if needed,
- Testing the methods,
- Evaluating the data and information obtained during the solution stage,
- Analyzing the significance and practicality of solution once it is reached
- Noticing new problems (MEBa, 2009).

Before solving the problems that students encounter in real life, they must be aware of these problems. At this stage, setting up the problem has an important place (Turhan and Güven, 2014, p.218).

Schön (1987) separated reflective thinking into two sections as pre-implementation and post-implementation. Reflective thinking skills towards problem solving involves the plan and process of focused thinking while taking problem solving steps during implementation process and after the implementation, finding a shortcut solution by comprehensively

focusing on the plan and operation of problem. A large number of studies show that once reflective thinking is utilized coordinately with a person's problem solving skill reflective thinking can become more effective. (cited in Şahin, 2009) Schön (1987) defined reflective thinking as enabling people to utilize their learning experiences during implementation process rather than merely using theoretical information (cited Tok, 2008). In that way students can, during the process of problem implementation, reach the solution via reflective thinking. A vast number of researches exist on problem solving (Özgen and Pesen, 2010; Çınar, Hatunoğlu and Hatunoğlu, 2009; Baş and Kıvılcım, 2013). As these researches suggest gender, school type, age, father's occupation and many other factors play role in perceiving problem-solving skills (Korkut, 2002).

Teacher qualities, probably the most critical of all the factors, have also been the focal point in a number of studies. Tuncer and Özeren (2012) analyzed reflective thinking skills towards problem solving of prospective teachers. To that end they explored prospective teachers' reflective thinking skills towards problem solving with respect to gender, department and grade. They underlined that teachers' reflective thinking skills are equally important as their students' reflective thinking skills. Teachers can polish their reflective thinking skills by putting themselves into students' shoes which in effect can create a real learning environment. Kızılkaya (2009) determined meaningful relations between students' reflective thinking skills and their academic achievement in mathematics course. Şen (2011) also identified meaningful relations between reflective thinking skills towards problem solving and academic achievement in mathematics course.

4.3.Discussions related to Third Sub Problem

Third subproblem of the research; "Is there any relationship between 8^{th} grade students' achievement motivation scale scores level and reflective thinking skill towards problem solving scores levels?" has been sought for an answer. The results of the study indicated that there was a significant positive correlation between the RTSTPS Scale and AMS Scores of the 8th grade students.

It can reasonably be claimed that there is a parallel rise between students' AMS and reflective RTSTPS. This parallelism might be related to the fact that students with high achievement motives are more interested and participative in mathematics course. In line with this

deduction it is likely that a student who is motivated to participate in class activities can develop much faster and practical methods in problem solving process.

Those who put their best efforts to reach success are the ones with higher motives for success. Teachers are expected to try hard to increase their motivation and students' as well. It would be unreasonable to expect teachers' with low motives for success to appropriately motivate their students (Umay, 2002). Umay (2009) in one of his studies found out that freshman students in Elementary Education Mathematics Teaching department have achievement motives above the average.

Bulut (2006) in his study examined achievement motivations of elementary education second level students towards mathematics course. It was reported that students whose achievement level was five had higher states of achievement compared to students with level two, three and four achievement motives. As seen once motivated students taste achievement they become even more motivated and students' state of achievement in mathematics course has positive effect in their achievement motivation. So long as students study hard for their lesson, their faith towards success correspondingly rises. A large number of studies identified a strong relation between learning and motivation (Şahin, Erdoğan and Kesici, 2010; Waege, 2010).

The really important things in the problem solving process, as well as the process itself are one of reaching a solution. At this process individuals are referred to think to take the event from different anglesand to rely on yourself (Yıldız and Eğiksu, 2012).

Yücel and Koç (2011) in their research pointed that a positive-direction significant relationship exists between attitude towards mathematics and achievement level in mathematics. In line with this finding it can be argued that so long as students' positive attitude towards mathematics course rises their achievement level in mathematics is most likely to climb. Arslan, Turan and Demirel (2010) in a study detected the positive effect of problem-based learning approach on students' motivation level. One of the most essential objectives of problem-based learning is to enhance students' intrinsic motivation. To that end, students' should be assigned with intriguing and challenging tasks. Once students spend more time in a subject and attach importance to a particular subject they are motivated more and inclined to put more effort. If the problems are unconstructed and original, students are further

motivated. Unconstructed problems let the students gain autonomy (Norman and Schmidt, 1992). In sum, problem-solving skills not only develop students' intrinsic motivation but also enable transferring the knowledge into a new problem case (Çınar, Hatunoğlu and Hatunoğlu, 2009; Norman and Schmidt, 1992). Teachers are required to employ several strategies to enhance students' achievement motivations. For instance Sılay and Gök (2009) detected that cooperative problem solving strategies have positive effects on students' success in physics course, strategy levels and achievement motivations. In this research, strategy teaching group received education by learning problem solving strategies in cooperative groups while control group was educated via traditional teaching methods and problem solving strategies. The research manifested that success rate, achievement motivation and problem-solving strategies' score averages of strategy-teaching group was comparatively higher than control group.

A student completing his/her task with intrinsic motivation is the one spending joyful time as well during these activities. Students with high intrinsic motivation are directed to learning objectives. However students with extrinsic motivation take part in class activities for the sake of rewards or for the sake of avoiding punishment. These students, under the effect of their teachers, parents, friends and associates, focus on performance goals (Middleton and Spanias, 1999).

Lack of Problem-solving skills, it is emphasized that is the cause of many mental health problems. Effective problem-solving helps in reducing the negative effects of daily life. Weak problem solving skills increases in the negative direction of the effects of stressful life events (Totan and Kabasakal, 2012).

Morcou and Philippou (2005) investigated motivational beliefs and self-regulated learning in the context of mathematical problem solving. Target orientation is the reason why students take part in activities. Students with high intrinsic target orientation set themselves standards such as the difficulty level of activities and curiosity which are unique standards of the students thus their personal development is elevated. Students with extrinsic target-orientation can maintain personal development via rewards, contests, grades or similar extrinsic factors. The results showed a significant relation between all dimensions of motivational beliefs and self regulated learning and between self-efficacy, intrinsic goal orientation and performance in mathematical problem solving.

Mathematics curriculum should be prepared to develop reflective thinking skills. Primarily teachers should reflect their knowledge and set good examples to their students. Teachers should come to class prepared and in this direction they should prepare activities to improve reflective thinking skills. Measurement & evaluation tools that can improve students' motivation and also support their multidimensional development also bear great importance. Margolis (2009) explains that "motivation emanates from experiences, expectations, and feelings. A student's motivation, or willingness to invest time and energy and take risks, is task and situation specific". A student's self-reflection on his/her own experiences will render substantial assistance particularly in problem solving.

The Ministry of National Education (2009, p.13) issues that as students gain more success in problem solving process and feel like their solution methods are valued, they will acquire greater self confidence towards their mathematics ability. Thus problems should be utilized not merely to gain problem-solving skills but to also raise motivation and teach mathematics. As also stipulated in MoNE (2009, p.13) mathematics curriculum once students effectively use problem solving skills, they can become more motivated and taste the sense of achievement.

5. RECOMMENDATIONS

Some suggestions emerged according to the results of the study and some educational implications became apparent. Suggestions for the implementers;

- In order to stimulate students' achievement motivations, teachers should initially gather adequate knowledge on students' motivation levels.
- Teachers should assign medium difficult tasks to students with low achievement motivations to ensure that they can also taste achievement.
- In order to make sure that teachers acquire further knowledge on the learning strategies and achievement motivation of students, in-service seminars should be organized.
- Teachers and students should be enlightened about the effects of achievement motivation on learning.
- While teaching mathematics, the teacher should make mathematics course more interesting, fun and entertaining so that students can develop positive attitudes towards mathematics.
- Teachers should continue their attempts to motivate students in and outside classroom.
- Students with low achievement motivations should be assigned with tasks in which they can make a connection between mathematics topics and daily life and they should be engaged in activities that are interesting and achievable so that they can develop positive attitudes towards the lesson.
- Teachers themselves should set good examples of achievement motivation in class and avoid creating a competitive classroom setting which directs students to rote learning with grade anxiety.
- Teachers should, instead of motivating students with extrinsic factors, assist them to develop intrinsic motivation via exploring their personal traits.
- During in-service trainings problem-solving process and problem-solving strategies that need to be internalized by teachers should be focused.
- Teachers should come to class prepared and give place to problem solving activities towards reflective thinking.
- Teachers should solve the problems in steps during class, guide their students and follow a specific plan. They should assign their students with the kind of feedbacks allowing them to employ reflective thinking on their problem solving skills.

- Students with refined problem solving skills can easily solve the problems they face in life which in effect guarantees their intrinsic motivation. In order to enhance students' motivation towards mathematics course their problem solving skills should also be improved.
- To the end of gaining reflective thinking skills, curriculum should be prepared towards the aim of developing reflective thinking skills.

Teachers can allot space to multidimensional activities aimed towards developing students' reflective thinking skills.

Suggestions for the researchers;

- The sampling method of the study limits the generalizability of the research findings to the broader context. Moreover, the sample did not consist of participants from public schools and only 8^{th} graders participated in the study. This study could be performed with different grade level students and comparisons of the results according to different grade levels could be done.
- Similar researches can be conducted in the spring term of 6^{th} grade, 7^{th} and 8^{th} grades, secondary education and higher education institutes with a wider scope of population.
- The level of students' achievement motivations with respect to different lessons and the underlying factors behind these motives can be investigated.
- A research can be implemented to determine teachers' knowledge level on the topic of achievement motivation.
- Achievement motivation towards mathematics can be investigated with respect to a set of variables.
- Parents should be enlightened about the process of motivation and be invited to seminars in which concrete examples on how to fuel intrinsic motivation are presented.

In present research, the effects of reflective thinking skill on problem solving process have been explored. In addition to reflective thinking, the effects of similar thinking skills on problem solving process could also be examined.

6. REFERENCES

Açıkgöz, K., Ü. (2003). Etkili Öğrenme ve Öğretme. İzmir: Eğitim Dünyası Yayınları.

Adnan, B. A. K. İ., GÜÇ, F. A., & ÖZMEN, Z. M. (2014). İlköğretim Matematik Öğretmeni Adaylarının Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerilerinin İncelenmesi). *Ijocis*, *2*(3).

Akbaba, S. (2006). Motivation In Education (Eğitimde Motivasyon). *Atatürk Üniversitesi Kazım Karabekir Eğitim Fakültesi Dergisi*, (13).

Alkan, V. (2011). Etkili matematik öğretiminin gerçekleştirilmesindeki engellerden biri: kaygı ve nedenleri. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, *29*(29), 89-107.

Altınok, H. (2004). İlköğretim Beşinci Sınıf Öğrencilerinin Başarı Güdüsü Ile Fen Başarısı Ve Cinsiyet Arasındaki İlişki. Çağdaş Eğitim. 313:17-22

Altun, M. (2002). İlköğretim Ikinci Kademede (6, 7 Ve 8. Sınıflarda) Matematik Öğretimi. *Alfa Basım Yayım Dağıtım, İstanbul*.

Arsal, Z. (2009). Problem Çözme Stratejilerinin Problem Çözme Başarısını Yordama Gücü. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*.

Aşkar, P. Ve Kızılkaya, G. (2009). Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerileri Ölçeğinin Geliştirilmesi. Education and Science 2009, Vol. 34, No 154

Ausubel, D. P., Novak, J. D., & Hanesian, H. (1968). Educational psychology: A cognitive view.

Aydın, B. (2003). Bilgi Toplumu Oluşumunda Bireylerin Yetiştirilmesi Ve Matematik Öğretimi.

Bakar, K. A., Tarmizi, R. A., Mahyuddin, R., Elias, H., Luan, W. S., & Ayub, A. F. M. (2010). Relationships between university students' achievement motivation, attitude and academic performance in Malaysia. *Procedia-Social and Behavioral Sciences*, *2*(2), 4906-4910.

Baş, G., & Kıvılcım, Z. S. (2012). Lise Öğrencilerinin Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerileri Ile Matematik Ve Geometri Derslerindeki Akademik Başarıları Arasındaki Ilişki. 27-30 Haziran. *X. Ulusal Fen Bilimleri Ve Matematik Eğitimi Kongresi*.

Baştürk, S& Dönmez, G. (2011). Examining Pre-Service Teachers' Pedagogical Content Knowledge With Regard To Curriculum Knowledge. International Online Journal Of Educational Sciences,3(2), 743-775

Baştürk, S. (2012). Sınıf Öğretmenlerinin Öğrencilerin Matematik Dersindeki Başarı Ya Da

Başarısızlığına Atfettikleri Nedenler. Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 4 (7), 105-118.

Baykul, Y. (2009). İlköğretimde Matematik Öğretimi.(6-8.Sınıflar). Ankara: Pegem A Yayıncılık.

Bedel, A., & Hamarta, E. (2014). The Relationship Between Interpersonal Problem Solving And Academic Motivation. *Elementary Education Online*,*13*(2), 674-681.

Bereby-Meyer, Y., & Kaplan, A. (2005). Motivational Influences On Transfer Of Problem-Solving Strategies. *Contemporary Educational Psychology*, *30*(1), 1-22.

Bozkurt, S. (2012). İlköğretim Ikinci Kademe Öğrencilerinde Sınav Kaygısı, Matematik Kaygısı, Genel Başarı Ve Matematik Başarısı Arasındaki Ilişkilerin Incelenmesi (yüksek lisans tezi). *İstanbul Üniversitesi, İstanbul*.

Brophy, J. (1999). Tovard a model of the value aspects of motivation in education: developing appreciation for particular learning domains and activities. Educational Psychologist, 34 (2), 75-86.

Broussard, S. C. (2002). *The Relationship Between Classroom Motivation And Academic Achievement In First And Third Graders* (Doctoral Dissertation, Faculty Of The Louisiana State University And Agricultural And Mechanical College In Partial Fulfillment Of The Requirements For The Degree Of Master Of Science In The School Of Human Ecology By Sheri Coates Broussard BCJ, Louisiana State University).

Bruce, A., & Books24x7, I. (2011). Manager's guide to motivating employees, second edition (2nd ed.). New York: McGraw-Hill.

Bulut, S. (2006). İlköğretim II. Kademe Öğrencilerinin Matematik Dersinde Kullandıkları Öğrenme Stratejileri Ve Başarı Güdüleri. Trakya Üniversitesi. Şubat, 2006.yüksek lisanstezi.

Büyüköztürk, Ş., Çakan, M., Tan, Ş., & Atar, H. Y. (2014). TIMSS 2011 Ulusal Matematik Ve Fen Raporu–8. Sınıflar.

Büyüköztürk, Şener (2004). Sosyal Bilimler İçin Veri Analizi El Kitabı, Ankara: PegemA Yayınları

Căprioară, D. (2014). Problem Solving-Purpose and Means of Learning Mathematics in School. *Procedia-Social and Behavioral Sciences*, *191*, 1859-1864.

Clayton, E. (2004). Pyscholocical Self-Help. http://www.psychologicalselfhelp.org/

Çakmak, M. (2000). İlköğretimde Matematik Öğretimi Ve Aktif Öğrenme Teknikleri. Gazi Üniversitesi Eğitim Fakültesi Dergisi, 20(3), 119-131.

Çınar, O. Hatunoğlu, A. Hatunoğlu, Y. (2009). Öğretmenlerin Problem Çözme Becerileri.

Erzincan Eğitim Fakültesi Dergisi Cilt-Sayı: 11-2

Çuha, Sema Seher (2004). Matematik Öğretiminde Eğitsel Oyunların Başarı, Akademik Benlik, Başarı Güdüsü¸ Ve Kalıcılık Üzerindeki Etkisi. Yayınlanmamış Yüksek Lisans Tezi. Hacettepe Üniversitesi, Sosyal Bilimler Enstitüsü.

Demirel, Ö. (2004). Kuramdan Uygulamaya Eğitimde Program Geliştirme. Ankara: Pegem-A Yayıncılık.

Demirel, M., Derman, I., & Karagedik, E. (2015). A Study on the Relationship between Reflective Thinking Skills towards Problem Solving and Attitudes towards Mathematics. *Procedia-Social and Behavioral Sciences, 197*, 2086-2096.

Demirtaş, H., Çınar. İ. (2004). Yönetici, Öğretmen, Veli Ve Öğrencilerin Başarı Algısı Ve Eğitime İlişkin Görüşleri. (Malatya İli Örneği). XIII.Ulusal Eğitim Bilimleri Kurultayı. Malatya: İnönü Üniversitesi.

DePasque, S., & Tricomi, E. (2015). Effects of intrinsic motivation on feedback processing during learning. *NeuroImage*, *119*, 175-186.

Dereli, E., Angın, E., & Karakuş, Ö. (2012). Factors That Affect The Problem Solving Skills Of Preschool Teacher Candidates: Academic Achievement And Types Of Anxiety. *International Journal Of Human Sciences*, *9*(2), 731-742.

Dewey, J. (1933). How We Think. A Restatement Of The Relation Of Reflective Thinking To The Educative Process, Boston: D. C. Heath.

Dikici, R., & İşleyen, T. (2003). Bağıntı ve fonksiyon konusundaki öğrenme güçlüklerinin bazı değişkenler açısından incelenmesi. *Kastamonu Eğitim Dergisi*, *11*(2), 105-116.

Doabler, C. T., Clarke, B., Fien, H., Baker, S. K., Kosty, D. B., & Cary, M. S. (2014). The science behind curriculum development and evaluation: Taking a design science approach in the production of a tier 2 mathematics curriculum.*Learning Disability Quarterly*, 0731948713520555.

Dostál, J. (2015). Theory of Problem Solving. *Procedia-Social and Behavioral Sciences*, *174*, 2798-2805.

Durmaz, B., & Altun, M. (2014). Ortaokul Öğrencilerinin Problem Çözme Stratejilerini Kullanma Düzeyleri.

Durmuş, S. (2004a) Matematikte Öğrenme Güçlüklerinin Saptanması Üzerine Bir Çalışma. Kastamonu Eğitim Dergisi, 12(1), 125–128.

Durmuş, S. (2004b) İlköğretim Matematiğinde Öğrenme Zorluklarının Saptanması Ve Zorlukların Gerisinde Yatan Nedenler Üzerine Bir Çalışma. VI. Ulusal Fen Bilimleri Ve Matematik Eğitimi Kongresi, Marmara Üniversitesi, İstanbul. İndirilme Tarihi:

20.09.2006, Www: Web: Http://Www.Nef.Balikesir.Edu.Tr/~Osi Nan/Files/ Ozetler.Pdf

Dursun, Ş., & Yüksel, D. E. D. E. (2004). Öğrencilerin Matematikte Başarısını Etkileyen Faktörler Matematik Öğretmenlerinin Görüşleri Bakımından. *Gazi Eğitim Fakültesi Dergisi*, *24*(2).

Duru, E., & Balkıs, M. (2015). Birey-Çevre Uyumu, Aidiyet Duygusu, Akademik Doyum ve Akademik Başarı Arasındaki İlişkilerin Analizi. *Ege Eğitim Dergisi*,*16*(1), 122-141.

Ekici, D. İ. (2014). The Perceptions and Views about Problem Solving Process of Pre-service Science Teachers. *Procedia-Social and Behavioral Sciences*,*141*, 308-312.

Ellis, R. (2003). Second Language Acquisition. (8th Edition). Bristol: Oxford University Press.

Erdoğan, A., Kesici, Ş., & Şahin, İ. (2011). Prediction Of High School Students\'Mathematics Anxiety By Their Achievement Motivation And Social Comparison. *İlköğretim Online*, *10*(2).

Ersoy, Y., Erbaş, K.,(2005). Kassel Projesi Cebir Testinde Bir Grup Türk Öğrencinin Genel Başarısı Ve Öğrenme Güçlükleri. İlköğretim-Online, 4 (1), 18-39.

Ersoy, Y. Ve Erbaş, K. (1998) İlköğretim Okullarında Cebir Öğretimi: Öğrenmede Güçlükler Ve Öğrenci Başarıları. Cumhuriyetin 75. Yılında İlköğretim I. Ulusal Sempozyumu, Başkent Öğretmen Evi, Ankara.

Fidan, Nurettin (1986). Okulda Öğrenme ve Öğretme. Ankara.

Gnitetskaya T. N., Ivanova Elena, B., & Kovalchuk N. N., (2015). Achievement Motive And Cognitive Stiles When Successfully Study Physics. *Procedia-Social And Behavioral Sciences*, *171*, 442-447.

Gottfried, A. E., Fleming, J. S., & Gottfried, A. W. (2001). Continuity Of Academic Intrinsic Motivation From Childhood Through Late Adolescence: A Longitudinal Study. *Journal Of Educational Psychology*, *93*(1), 3.

Gök, T. Ve Sılay, İ. (2009). İşbirlikli Problem Çözme Stratejileri Öğretiminin Öğrencilerin Başarısı Ve Başarı Güdüsü Üzerindeki Etkileri. Hasan Ali Yücel Eğitim Fakültesi Dergisi, 11, (1), 13-27.

Gökhan, B. A. Ş., & KIVILCIM, Z. S. (2013). Lise Öğrencilerinin Problem Çözmeye Yönelik Yansıtıcı Düşünme Becerileri Ile Matematik Ve Geometri Derslerindeki Akademik Başarıları Arasındaki İlişki. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *14*(3).

Gözen, Ş. (2001). Matematik ve öğretimi. *Evrim Yayınevi, İstanbul*, *11*.

Green, M. H. (1995). Influences Of Job Type, Job Status, And Gender On Achievement Motivation. *Current Psychology*, *14*(2), 159-165.

Gülveren, H. (2007). Sınıfta Öğrencilerin Motivasyonu. M. Şişman Ve S. Turan (Ed.), Sınıf Yönetimi (Ss. 69–84). Ankara: Pegem A Yayıncılık.

Gürlen, E. (2015). An Analysis of Mathematics Curriculum at Secondary Level.*Procedia-Social and Behavioral Sciences*, *174*, 1404-1407.

Hacısalihoğlu, H., Mirasyedioğlu,., Akpınar, A., (2004), Matematik Öğretimi, Asil Yayın Dağıtım, Ankara, S. 2-3

Harskamp, E., & Suhre, C. (2007). Schoenfeld's Problem Solving Theory In A Student Controlled Learning Environment. *Computers & Education*, *49*(3), 822-839.

Hembree, R. (1990) "The Nature, Effect And Relief Of Mathematics Anxiety", Journal Of Research In Mathematics Education, 21 (1), 33–46.

Hitchcock, C., Meyer, A., Rose, D., & Jackson, R. (2002). Providing new access to the general curriculum. *Teaching Exceptional Children*, *35*(2), 8-17.

İflazoğlu, U. A. (2000). Küme Destekli Bireyselleştirme Tekniğinin Temel Eğitim Beşinci Sınıf Öğrencilerinin Matematik Başarısı Ve Matematiğe Ilişkin Tutumları Üzerindeki Etkisi. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *6*(6)

İlhan, M., & Sünkür, M. Ö. (2012). Matematik Kaygısı ile Olumlu ve Olumsuz Mükemmeliyetçiliğin Matematik Başarısını Yordama Gücü. *Mersin üniversitesi Eğitim Fakültesi Dergisi*, *8*(1).

Ismail, S. F. Z. H., Shahrill, M., & Mundia, L. (2014), Factors Contributing to Effective Mathematics Teaching in Secondary Schools in Brunei Darussalam.

Kaptan, F., & Korkmaz, H. (2002). Fen Eğitiminde Proje Tabanlı Öğrenmenin Yaratıcı Düşünme, Problem Çözme Ve Akademik Risk Alma Düzeylerine Etkisi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *22*(22).

Karasel, N., Ayda, O., & Tezer, M. (2010). The Relationship Between Mathematics Anxiety And Mathematical Problem Solving Skills Among Primary School Students. *Procedia-Social And Behavioral Sciences*, *2*(2), 5804-5807.

KEENAN, Kate. Motivasyon. (Motivation) Çev: Ergin KOPARAN. İstanbul. Remzi Kitabevi, 1996.

Kızılkaya, G., & Aşkar, P. (2009). Problem çözmeye yönelik yansıtıcı düşünme becerisi ölçeğinin geliştirilmesi. *Eğitim ve Bilim*, *34*(154), 82-92.

Kim, J. I., & Chung, H. (2012). The Role Of Family Orientation In Predicting Korean Boys'

And Girls' Achievement Motivation To Learn Mathematics. *Learning And Individual Differences*, *22*(1), 133-138.

Koray, Ö. Azar, A. Ortaöğretim Öğrencilerinin Problem Çözme Ve Mantiksal Düşünme Becerilerinin Cinsiyet Ve Seçilen Alan Açisindan İncelenmesi. Kastamonu Eitim Dergisi 125-136

Korkut, F. (2002). Lise Öğrencilerinin Problem Çözme Becerileri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *23*(23).

Köse, M.R. (1998). Başarı Yönelimlerindeki Cinsiyet Farklılıkları, Akademik Seçim Ve Edinimlere Dönük Etkiler. Eğitim Ve Bilim, C. 22 (107), S. 36-45,

Lai, E. R. (2011). Motivation: A Literature Review. *Pearson's Research Report*,*2*, 4-5.

Mala, D. Veresova, M. 2013. Objectivity Of Learning Performance Evaluation Evaluated By School Age Pupils As An Assumption Of Achievement Motivation And School Success. *Social And Behavioral Sciences*, 106 (2013) 1958 – 1965.

Malá, D., & Čerešník, M. (2013). The Relation of the School Effectiveness and the Achievement Motivation of the School Age Pupils. *Procedia-Social and Behavioral Sciences*, *106*, 3026-3032.

Marcou, A., & Philippou, G. (2005). Motivational Beliefs, Self-Regulated Learning And Mathematical Problem Solving. In *PME CONFERENCE* (Vol. 29, No. 3, P. 3).

Margolis, H. (2009). Student Motivation: A Problem Solving Focus. *Reading Disabilities: Beating The Odds*, *84*.

Maslow, A. H. (1943). A Theory Of Human Motivation. *Psychological Review*, *50*(4), 370-396.

Mcclelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. (1976). The Achievement Motive.

Michael Young (2013) Overcoming the crisis in curriculum theory:a knowledge-based approach, Journal of Curriculum Studies, 45:2, 101-118. Retrieved from http://dx.doi.org/10.1080/00220272.2013.764505

Middleton, J. A., & Spanias, P. A. (1999). Motivation For Achievement In Mathematics: Findings, Generalizations, And Criticisms Of The Research. *Journal For Research In Mathematics Education*, 65-88.

Miller, N. C. (2000). Perceptions Of Motivation In Developmental Mathematics Students: I Would Rather Drill My Own Teeth.

MoNE (2005). National Final Report Of Pisa 2003 Project. (Pisa 2003 Projesi

Ulusal Nihai Raporu) (EARGED).[Online] Http://Earged. Meb. Gov. Tr/Pisa/Dokuman/2003/Rapor.*PISA_RAPOR_2003. Pdf Adresinden*, *21*.

MoNE (2005). Talim Terbiye Kurulu Program Geliştirme Çalışmaları.*Öğretim Programlarının Yenilenmesini Zorunlu Kılan Nedenler*.

MoNEa :Milli Eğitim Bakanlığı Talim Terbiye Kurulu Başkanlığı, Matematik Dersi Öğretim Programı Ve Kılavuzu (2005, P. 17).

MoNEa (2009). Milli Eğitim Bakanlığı. İlköğretim Matematik Öğretim Programı. Ankara: Milli Eğitim Basımevi.

MoNE (2012). PISA 2012 Projesi Ulusal Ön Raporu. Retrieved On June 20, 2014 From Www.Http://Pisa.Meb.Gov.Tr.

MoNE (2013). Pisa Uluslararası Öğrenci Değerlendirme Programı: Pisa 2012 Ulusal Ön Raporu. *Ankara: Yeğitek*.

Murray, S. R., & Mednick, M. T. (1975). Perceiving The Causes Of Success And Failure In Achievement: Sex, Race, And Motivational Comparisons. *Journal Of Consulting And Clinical Psychology*, *43*(6), 881.

National Council Of Teachers Of Mathematics. (2000). Principles And Standards For School Mathematics Electronic Version. Http://Standards.Nctm.Org.

Nesin, A.,(2010). *Matematik ve doğa*. Nesin Yayıncılık.

Nicolescu, B. N., & Petrescu, T. C. (2015). On the Continuity Mathematics Curriculum Between Primary and Secondary School. *Procedia-Social and Behavioral Sciences*, *180*, 871-877.

Norman, G. R. And Schmidt, G. (1992). The Psychological Basis Of Problem-Based Learning: A Review Of The Evidence. Academic Medicine, 67 (9), 557-565

Olmez, I. B., & Ozel, S. (2012). Mathematics Anxiety Among Sixth And Seventh Grade Turkish Elementary School Students. *Procedia-Social And Behavioral Sciences*, *46*, 4933-4937.

Örücü, E., & Kanbur, A. (2008). Örgütsel-Yönetsel Motivasyon Faktörlerinin Çalışanların Performans Ve Verimliliğine Etkilerini Incelemeye Yönelik Ampirik Bir Çalışma: Hizmet Ve Endüstri Işletmesi Örneği. *Yönetim Ve Ekonomi*, *15*(1), 85-97.

Özdoğan, Z. B., Seyitoğlu, E., & Güven, B. (2011). The Change Over The Years Of Problem Solving Skills Of Pre-Service Elementary Mathematics Teachers.*Procedia-Social And Behavioral Sciences*, *15*, 2278-2283.

Özgen, K., & Pesen, C. Probleme Dayali Öğrenme (Pdö) Yaklaşimi İle İşlenen Matematik Dersinde Öğrencilerin Problem Çözme Becerilerinin Analizi. *National Education*, 27.

Ozgur, S. D., Temel, S., & Yilmaz, A. (2012). The Effect Of Learning Styles Of Preservice Chemistry Teachers On Their Perceptions Of Problem Solving Skills And Problem Solving Achievements. *Procedia-Social And Behavioral Sciences,46,* 1450-1454.

Özsoy, G. (2005). Problem Çözme Becerisi Ile Matematik Başarısı Arasındaki İlişki. (Success With Math Problem Solving Skills The relationship between). *Gazi Eğitim Fakültesi Dergisi*, *25*(3)

Öztürk, E., & Uzunkol, E. (2013). İlkokul Öğretmeni Motivasyon Ölçeğinin Psikometrik Özellikleri. *Eğitimde Kuram Ve Uygulama*, *9*(4), 421-435.

Pajares, F., & Schunk, D. H. (2001). Self-beliefs and school success: Self-efficacy, self-concept, and school achievement. *Perception*, *11*, 239-266.

Peker, M., & Mirasyedioğlu, Ş. (2003). Lise 2. Sınıf Öğrencilerinin Matematik Dersine Yönelik Tutumları Ve Başarıları Arasındaki Ilişki. (High School 2nd Grade Students With Attitude Towards Mathematics Achievement Relationship Between). Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 14(14), 157-166

Peker, M. (2005). İlköğretim Matematik Öğretmenliğini Kazanan Öğrencilerin Öğrenme Stilleri Ve Matematik Başarısı Arasındaki Ilişki. *Eğitim Araştırmaları*,*21*, 200-210

Petri,Herbert L. (1996). Motivation Theory,Research And Applications. Forth Edition

PISA. (2003). "Problem Solving For Tomorrow's World First Measures Of Cross-Curricular Competencies From PISA 2003" [Online] Retrieved On 18-November-2008, At URL: Http://Www.Pisa.Oecd.Org/ Dataoecd/25/12/34009000.Pdf

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of educational psychology*, *82*(1), 33.

Pintrich, P. R. Ve Schunk D.H. (2002). Motivation In Education: Theory, Research, And Applications. (2. Baskı). New Jersey: Pearson Education.

Polya, G. (2014). *How to Solve It: A New Aspect of Mathematical Method: A New Aspect of Mathematical Method*. Princeton university press.

Posamentier A. S. And Krulik S. (1998). Problem-Solving Strategies For Efficient And Elegant Solutions. A Researce For The Mathematics Teacher, California: Corwin Press, Inc

Ray, J. J. (1979). A quick measure of achievement motivation—validated in Australia and reliable in Britain and South Africa. *Australian Psychologist*,*14*(3), 337-344.

Royle, M. T., & Hall, A. T. (2012). The Relationship Between Mcclelland's Theory Of

Needs, Feeling Individually Accountable, And Informal Accountability For Others. International Journal Of Management And Marketing Research, 5(1), 21-42.

Salili, F. (1996). Achievement Motivation: A Cross-Cultural Comparison Of British And Chinese Students. *Educational Psychology*, *16*(3), 271-279.

Schön, D. A. (1987). Educating The Reflective Practitioner: Toward A New Design For Teaching And Learning In The Professions. *San Francisco*.

Senemoğlu, N. (1990). Öğrenci Giriş Nitelikleri İle Öğretme-Öğrenme Süreci Özelliklerinin Matematik Dersilerindeki Öğrenme Düzeyini Yordama. Gücü.*Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *5*(5).

Sevindir, H. K., Yazici, C., & Yazici, V. (2014). Mathematics Anxiety: A Case Study For Kocaeli University. *Procedia-Social And Behavioral Sciences*, *152*, 637-641.

Shavelson, R. J., & Bolus, R. (1982). Self Concept: The Interplay Of Theory And Methods. *Journal Of Educational Psychology*, *74*(1), 3.

Soyer, F., Sarı, İ., & Talaghir, L. G. (2014). The Relationship Between Perceived Coaching Behaviour And Achievement Motivation: A Research In Football Players. *Procedia-Social And Behavioral Sciences*, *152*, 421-425.

Soylu, Y., & Soylu, C. (2006). Matematik Derslerinde Başariya Giden Yolda Problem Çözmenin Rolü.

Stewart, W. (2003). Foundations of Education (Educ 2112, lesson notes). Oklahoma Panhandle State University. (http://www.opsu.edu/education/Stewart/presentations/Chapter 11 Handouts with slides.pdf).

Sturt G. (2004) "Humanistic Approaches to Teaching" (http://www.garysturt.free online.co.uk/human.htm)

Sullivan, P. (2011). Teaching mathematics: Using research-informed strategies.

Şahin, İ. (2005). Humanizm Ve Eğitim. *Elektronik Sosyal Bilimler Dergisi*,*11*(11).

Şahin, Ç. (2009). Fen Bilgisi Öğretmen Adaylarının Yansıtıcı Düşünme Yeteneklerine Göre Günlüklerininin İncelenmesi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *36*(36).

Şahin, Ö., Erdem, E., Başıbüyük, K., Gökkurt, B., & Soylu, Y. (2014). Ortaokul Matematik Öğretmenlerinin Sayılarla İlgili Pedagojik Alan Bilgilerinin Gelişiminin İncelenmesi. *Turkish Journal Of Computer And Mathematics Education Vol*,*5*(3), 207-230.

Şahin, İ, Erdoğan, A., & Kesici, Ş.,. (2011). Prediction of High School Students\'Mathematics Anxiety by Their Achievement Motivation and Social Comparison. *İlköğretim Online*, *10*(2).

Şen, H. Ş. (2011). İlköğretim öğrencilerinin problem çözmeye dayalı yansıtıcı düşünme becerileri. 4-8 Ekim. *I. Uluslararası eğitim programları ve öğretim kongresi*.

Şenol, A., Dündar, S., Kaya, İ., Gündüz, N., & Temel, H. (2015). Investigation Of Secondary School Mathematics Teachers'opinions On Mathematics Fear. *Journal Of Theory And Practice In Education*, *11*(2), 653-672.

Tahiroğlu, M., & Çakir, S. (2014). İlkokul 4. Sınıflara Yönelik Matematik Motivasyon Ölçeğinin Geliştirilmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *15*(3).

Tatar, E., Okur, M., & Tuna, A. (2008). Ortaöğretim Matematiğinde Öğrenme Güçlüklerinin Saptanmasina Yönelik Bir Çalişma.

Tanaka, A., & Yamauchi, H. (2001). A model for achievement motives, goal orientations, intrinsic interest, and academic achievement. *Psychological Reports*, *88*(1), 123-135.

Tatar, Enver, And Ramazan Dikici. Matematik Eğitiminde Öğrenme Güçlükleri. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi* 5.9 (2008): 183-193.

Ţicu, D. (2013). Theories of motivation in public policies process. *Procedia-Social and Behavioral Sciences*, *92*, 925-929.

Tok, Ş. (2008). The effects of reflective thinking activities in science course on academic achievements and attitudes toward science. *Elementary Education Online*, *7*(3), 557-568.

Totan, T., & Kabasakal, Z. (2012). Problem çözme becerileri eğitiminin ilköğretim altıncı sınıf öğrencilerinin sosyal ve duygusal öğrenme ihtiyaçları ve becerileri üzerine etkisi. *İlköğretim Online*, *11*(3).

Tuncer, M., & Ozeren, E. (2012). Prospective Teacher's Evaluations In Terms Of Using Reflective Thinking Skills To Solve Problems. *Procedia-Social And Behavioral Sciences*, *51*, 666-671.

Tuncer, M., & Ozeren, E. (2012). Prospective Teacher's Evaluations In Terms Of Using Reflective Thinking Skills To Solve Problems. *Procedia-Social And Behavioral Sciences*, *51*, 666-671.

Turabik, T., & Baskan, G. A. (2015). The Importance of Motivation Theories in Terms Of Education Systems. *Procedia-Social and Behavioral Sciences*, *186*, 1055-1063.

Turhan, B., & Güven, M. (2014). Problem Kurma Yaklasimiyla Gerçeklestirilen Matematik Ögretiminin Problem Çözme Basarisi, Problem Kurma Becerisi Ve Matematige Yönelik Görüslere Etkisi. *Çukurova University. Faculty of Education Journal*, *43*(2), 217.

Umay, A. (2002). Matematik Öğretmen Adaylarının Başarı Güdüsü Düzeyleri, Değişimi Ve Değişimi Etkileyen Faktörler. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi. 22:148-155

Umay, A. (2003). Matematiksel Muhakeme Yeteneği. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 24(24).

Üredi, I., & Üredi, L. (2005). İlköğretim 8. Sınıf Öğrencilerinin Öz-Düzenleme Stratejileri Ve Motivasyonel Inançlarının Matematik Başarısını Yordama Gücü. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, *1*(2).

Yavuz, G., Arslan, C., & Gulten, D. C. (2010). The Perceived Problem Solving Skills Of Primary Mathematics And Primary Social Sciences Prospective Teachers. *Procedia-Social And Behavioral Sciences*, *2*(2), 1630-1635.

Yenice, N., Saydam, G., & Telli, S. (2012). İlköğretim Öğrencilerinin Fen Öğrenmeye Yönelik Motivasyonlarını Etkileyen Faktörlerin Belirlenmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *13*(2).

Yetkin, E. (2003) Student Difficulties In Learning Elementary Mathematics. ERIC Clearinghouse For Science, Mathematics And Environmental Education, Columbus, OH., ED482727. İndirilme Tarihi: 12.02.2005, Www:Web:Http://Www. Eric.Ed.Gov.

Yildirim, S., & Projesi, Y. L. Motivasyon Ve Çalişma Yaşaminda Motivasyonun Önemi.

Yıldız, S. Ve Turanlı, N. (2010). Öğrenci Seçme Sınavına Hazırlanan Öğrencilerin Matematik Dersine Yönelik Tutumlarının Belirlenmesi. Selçuk Üniversitesi, Ahmet Keleşoğlu Eğitim Fakültesi Dergisi, 30, 361-377.

Yıldız, İ., & Uyanık, N. (2004). Lise Öğrencilerinin Matematiğe Karşı Tutumları. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*.

Yusuf, M. (2011). The Impact Of Self-Efficacy, Achievement Motivation, And Self-Regulated Learning Strategies On Students' Academic Achievement.*Procedia-Social And Behavioral Sciences*, *15*, 2623-2626.

Yazici, H. Öğretmenlik Mesleği, Motivasyon Kaynaklari Ve Temel Tutumlar: Kuramsal Bir Bakiş. 17(1).33-46

Yazgan, Y., & Bintaş, J. (2005). İlköğretim Dördüncü Ve Beşinci Sınıf Öğrencilerinin Problem Çözme Stratejilerini Kullanabilme Düzeyleri: Bir Öğretim Deneyi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *28*(28).

Yazgan, Y. (2007). Dördüncü Ve Beşinci Sınıf Öğrencilerinin Rutin Olmayan Problem Çözme Stratejileriyle Ilgili Gözlemler. *İlköğretim Online*, *6*(2).

Yildiz, S. A., & Eğiksu, M. Problem Çözme Becerisini Geliştirme Programinin 9. Sinif

Öğrencilerinin Problem Çözme Becerisi Üzerindeki Etkisi. The Effect Of Improving Problem Solving Skill Program On 9. Grade Student's Problem Solving. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, *13*(1).

Yücel, Z., & Koç, M. (2011). İlköğretim öğrencilerinin matematik dersine karşı tutumlarının başarı düzeylerini yordama gücü ile cinsiyet arasındaki ilişki.*İlköğretim Online*, *10*(1).

Wæge, K. (2009). Motivation For Learning Mathematics In Terms Of Needs And Goals. *CERME 6–WORKING GROUP*, 84.

Wolters, C.A., Yu, S. L. & Pintrich, P. R. (1996). The Relation Between Goal Orientation And Students' Motivational Beliefs And Self-Regulated Learning. Learning And Individual Differences, 8(3), 211-238.

Woolfolk, A., Hoy, A. W., & McCune-Nicolich, L. (1980). *Educational psychology for teachers*. Prentice Hall.

Zimmermann, B. J. (1989). Models of self-regulated learning and academic achievement. *Self-regulated learning and academic achievement. Theory, research and practice*, 1-25.

Zohrabi, M. (2014). Promoting Teacher Development through an Interactive Approach to Curriculum Development. *Procedia-Social and Behavioral Sciences*, *98*, 2025-2034.

APPENDICES

KİŞİSEL BİLGİLER

1. Cinsiyetiniz: ( ) Kız ( ) Erkek

2. Matematik öğretmeninizin cinsiyeti: ( ) Bayan ( ) Bay

2. Anneniz çalışıyor mu? ( ) Evet ( ) Hayır

3. Anneniz çalışıyor ise mesleği nedir?

4. Babanız çalışıyor mu? ( ) Evet ( ) Hayır

8. Babanız çalışıyor ise mesleği nedir?

9. Annenizin eğitim durumu:

( ) Okur-yazar değil ( ) Okur-yazar ( ) İlkokul

( ) Ortaokul ( ) Lise ( ) Üniversite

9. Babanızın eğitim durumu:

( ) Okur-yazar değil ( ) Okur-yazar ( ) İlkokul

( ) Ortaokul ( ) Lise ( ) Üniversite

10. Okul öncesi eğitim aldınız mı? (Anaokulu veya anasınıfına gittiniz mi?)

( ) Evet ( )Hayır

11. Okul dışında matematik dersine destek alma durumu:

( )Bir uzmandan (özel öğretmen vb.) destek alıyorum.

( )Uzman olmayan bir yakınımdan destek alıyorum.

( )Dershane veya kursa gidiyorum.

( )Destek almıyorum.

2.Ailenizin gelir düzeyi:

( ) 3200 YTL ve üzeri

( ) 1600 YTL – 3200 YTL

( )800YTL -1600 YTL

( )400 YTL – 800 YTL

( )400 YTL ve altı

Sevgili Öğrenci,

Bu ölçek, sizin başarı güdüsü düzeyinizi saptamak amacıyla geliştirilmiştir. Burada belirteceğiniz görüşler yalnızca araştırma amacıyla kullanılacak ve tüm grubun yanıtları göz önüne alınarak değerlendirilecektir. Bu araştırmanın geçerliği için gerçek düşüncelerinizi belirtmeniz özel bir önem taşımaktadır. Lütfen hiçbir maddeyi boş bırakmayınız ve her biri için tek yanıt veriniz.

BAŞARI GÜDÜSÜ ÖLÇEĞİ

1.Matematik dersinde kendinizi başarılı buluyor musunuz?

( ) Evet ( ) Hayır

2.Sizce başarı nedir? Kendinize daha yakın bulduğunuz seçeneği işaretleyin.

( ) Kişinin eskisinden daha başarılı olması (Kendisini aşması)

( ) Kişinin diğerlerinden daha başarılı olması (başkalarını geçmesi)

3.Bu derste başarılı olmak için birçok şey gerekir. Sizce bunların içinde belirleyici olan hangisidir?

( ) Yetenek, beceri, zekâ, şans ( ) Çaba, gayret, çalışma

4.Bu derste en çok aşağıdakilerden hangisi için çalışırsınız?

( ) Yeni bir şeyler öğrenmek

( ) İyi not almak

( ) Sınıf geçmek

( ) Yeteneklerimi geliştirmek

5.Başarılı olduğunuzda hem aileniz ve çevreniz hem de kendiniz mutlu olursunuz. Ancak bir tercih yapmanız istense bu derste başarılı olmayı en çok kimin için istersiniz?

( ) Ailem ve öğretmenlerim ( ) Kendim

6.Herkesin yaşamında ulaşmaya çalıştığı yakın (hemen gerçekleşebilecek) ya da uzak (uzun sürede ulaşılabilecek) türden hedefler vardır. Siz matematik çalışmak üzere oturduğunuzda kendinize en çok hangi türden hedefler koyarsınız?

( ) Akşama kadar 10 sayfa bitirmek, konunun sonuna ulaşmak ödevlerimi bitirmek, sınavdan başarılı olmak gibi kısa sürede ulaşabileceğim hedefler koyarım.

( ) Sınıfı geçmek, iyi bir iş sahibi olmak, toplumda saygınlık kazanmak gibi uzun vadede gerçekleşecek hedefler koyarım.

( ) Kendime herhangi bir hedef koymam, öğrenmem gerektiği için sıkılana kadar oturur çalışırım.

7.Bu derste koyduğunuz hedefi en çok hangisine benzer?

( ) Geçer not almak yeter.

( ) Alabileceğimi umduğum en iyi notu almalıyım.

( ) Alınabilecek en iyi notu almalıyım.

Düşünceler	Çoğu Zaman	Ara sıra	Hiçbir zaman
1. Çalışırken beni zorlayan ve uğraştıran çalışmalar yapmayı tercih ederim.			
2. Çözümsüz kalan durum ya da problemlerde şansımı yeniden denemekten hoşlanırım.			
3. Sonuca kolayca ulaşabileceğim türden alıştırmalar yapmaktan hoşlanırım.			
4. Bir alıştırmada sonuca kolayca ulaşmazsam hayal kırıklığı yaşarım.			
5. Yeterince çalışırsam başarılı olacağıma inanırım.			
6. Başarısızlığa uğrama düşüncesi beni korkutur.			
7. Önemli olanın bir sonuca ulaşmak olduğuna değil, çaba göstermek olduğuna inanırım.			
8. Bir alıştırma, konu ya da problem üzerinde çalışırken coşku duyarım.			
9. Bu derse karşı yeteneğim olduğunu sanıyorum.			
10. Bu dersin ileride bana yararının dokunacağına inanıyorum.			
11. Derslerimiz zevkli geçiyor.			
12. Başarılı olduğumda öğretmenlerim beni yeterince takdir eder.			
13. Öğretmenimin beni sevdiğine inanıyorum.			
14. Zor işleri başarınca mutlu oluyorum.			

PROBLEM ÇÖZMEYE YÖNELİK YANSITICI DÜŞÜNME BECERİSİ ÖLÇEĞİ

	Her zaman	**Çoğu zaman**	**Bazen**	**Nadiren**	**Hiçbir zaman**
1) Bir problemi çözemediğimde, neden çözemediğimi anlamak için kendime sorular sorarım.					
2) Problemi çözdükten sonra daha iyi bir çözüm yolu bulabilir miyim diye düşünürüm.					
3) Arkadaşlarımın çözüm yollarını sorgulayarak daha iyi bir yol bulmaya çalışırım.					
4) Çözüm yollarımı tekrar tekrar değerlendirip bir sonraki problemi daha iyi çözmeye çalışırım.					
5) Problem çözerken, hangi işlemi neden yaptığımı düşünerek yaparım.					
6) Bir problemi çözdüğümde, yaptığım işlemleri tekrar inceler, değerlendiririm.					
7) Problem çözerken, farklı çözüm yolları bulmak için kendime sorular sorarım.					
8) Problem çözerken, yaptığım işlemlerin nedenini düşünerek, bulduğum sonuçla ilişkisini kurmaya çalışırım.					
9) Bir problemi okuduğumda, çözüm için hangi bilgiye ihtiyacım olduğunu düşünürüm.					
10) Problemi çözüp sonucunu bulduktan sonra yaptığım işlemleri kontrol ederim**.**					
11) Bir problemi okuduğumda, daha önce çözdüğüm problemleri düşünerek benzerlik ve farklılıklarına göre aralarında ilişki kurarım.					
12) Problem çözerken, her işlemimi önceki ve sonraki adımlarımı düşünerek yaparım.					
13) Problemi okuduğumda verilen ve istenenleri belirlemek için kendime sorular sorarım.					
14) Problemi çözdükten sonra arkadaşlarımın çözümleri ile karşılaştırır, sonucumu değerlendiririm.					

Anketimiz tamamlanmıştır. Katılımınız için tekrar teşekkür ederiz**.**