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# Students' performances in solving 2nd Degree Equations with one Unknown

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**Abstract**

The purpose of this study is to examine the performance showed by the students in solving 2nd degree equations (quadratic equation) with one unknown. The study made use of qualitative research. Sample of the resarch is 23 10th grade students from two different schools, Anatolian Turgutlu High School and Milli Piyango Anatolian High School in Turgutlu district in the city of Manisa in the academic year 2012-2013. In order to collect the research data, 5 quadratic equations with one unknown whose degrees of difficulty are not the same were selected from the different textbooks relevant to the topic. The data obtained have been analyzed by the researchers. As a result of the research, it is determined that all of the students know the formulas as they memorize the required formulas while solving a quadratic equation with one unknown. Therefore, it is observed that the entire students solved the question in case of the question type in which the formula is directly applied. It is found that even though a portion of students knows the formulas they did not know how to solve the question by putting information together. In other words, it is observed that for the question types which can be solved by making interpretation the students made mistakes and even the vast majority of them could not solve the question. The students also need the information of square root concept so as to be able to solve the questions. Some questions containing square root concept in solving quadratic equation with one unknown were found difficult by the students.



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*Keywords:* Mathematics education, 2nd degree equations with one unknown (quadratic equation with one unknown), the achievement of solving equation;

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## 1. Introduction

Nowadays, almost every kind of occupational groups is required a little knowledge of mathematics, especially mathematical thinking. Employers expect their workers to solve the problems which have never been come across before. This raises the requirement for producing solutions to the problem by reasoning instead of incomplete mathematical skills. Hence, the new understanding in mathematics education is to bring the learning mathematics to the forefront by making mathematics rather than learning math-only in accordance with the definition of mathematics (Olkun & Toluk, 2003). A variety of problems has been experiencing in mathematics education and teaching in each country to the same extent and, even though it is not common, nearly in all schools in Turkey. For example, the primary and secondary school students have been facing a number of challenges and difficulties in learning the mathematics topics; in addition, they take a dislike to the mathematics courses and worry about them (Ersoy & Ardahan, 2003). All this negativity observed in schools has a large number of reasons such as teacher, student, physical conditions of the class, program, etc. and a number of negative factors accelerate the process (Yenilmez, 2007).

The development of the process of education is possible with a continuous regeneration by means of elimination of difficulties, overcoming deadlocks, elimination of deficiencies and mistakes. Determination of the topics which students have difficulty in an area forms the basis for the studies which will be done on this topic. It is impossible that an individual who has learning disabilities on a topic in the course of math described as a cumulative science especially in the way of building topics on each other can perform his further learnings without problem (Altun, 1998). In the study in which they used of a multiple-choice detection test containing questions from various topics such as four operations, factorization, equation solving, absolute value, function and the logarithm, Tall and Razali (1993) indicated that the learning difficulties concentrate on how students use the concepts and coordinate the operations. Likewise, they indicated that the challenges faced by the perceivers as operational are more than the challenges faced by the perceivers as conceptual. All concepts in mathematics are related to each other, each new concept is another relationship built upon the concept of its predecessor. Nowadays it is considered that an effective learning suited to the structure of mathematics can be performed via “relational learning". The relational learning consists of concepts and processes knowledge as well as the relationship between them. After the student gains the knowledge of the concepts and processes, if he cannot associate the concepts information to the processes information he would not be capable of learning math (Baykul, 2003). According to Willoughby (1991), there are four effective steps the children can follow to learn math.

1) Derivation of mathematics on their own reality,
2) Discover and use of the power of abstract thinking,
3) Practising,
4) Applying mathematics to an interesting thing for themselves (Sahin, 2007).

According to Pressley (1995), mathematical learning is better if it is a result of the students’ own activities. When the children create their own mathematical understanding, the information is firmly connected to those the children learnt before.

The main objective of the elementary school and high school mathematics curriculum is to develop algebra and algebraic thinking. Algebra is usually perceived as various symbols, expressions, and their presences, and the equations and solving the equations (Smith, Eisenmann, Jansen & Star, 2000). In our country as in many other countries, algebra is also among the information that an individual being educating through the basic and mandatory training must obtain. The students begin to meet the algebra topics in second year class of elementary education and this topic forms the basis of many topics they will encounter in their future mathematical trainings.

Algebra is acquired the ability of abstract thinking and hence logical interpretation to the students. Introduction to the symbolic notation in algebra is important for the development of basic mathematical concepts. Algebra, in general, is a branch of mathematics transforming information into generalized equations by using numbers and symbols. In his study, Davis (1986) said that the essence of mathematics is not in the symbols but in the ideas the symbols symbolize. Despite the use of many different methods in teaching algebra, still the most common one is the traditional methods. Although algebra is required in our life, most of the students try to learn algebra by memorizing and most of the teachers canalize the students to learn it by heart through their teaching methods they have been using. Teachers should teach the algebra in such a way that they maximize the levels of understanding and remembrance of the students (Kitt and Leitze, 1992;Yenilmez, Teke, 2008). In another study done by Ersoy and Erbas (2002), the success in basic algebra, especially equating and solving of the 9th grade students and accordingly