

DETERMINATION OF MATHEMATICS TEACHERS AND PRE-SERVICE TEACHERS' PERCEPTIONS ABOUT TEACHING THROUGH MODELING

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Introduction

Teacher is one of the basic elements of the teaching and learning phases. He is the person who continuously interacts with the student, performs the curriculum, manages the instruction and evaluates both student and instruction. The characteristics of teachers effect mainly the characteristics of these phases (MEB OYEGM, 2001).

In USA the examination of the effect of the characteristics of the teachers on students' achievements started to be discussed with Coleman's report in 1960. The results of this study realized with 800.000 students excited great repercussions in USA. After the Coleman's report various studies had been realized on education system of USA and characteristics of teachers and the results of these studies were discussed in different (Stevenson ve diğ., 1968; Stevenson ve diğ., 1986, Stevenson ve diğ., 1990; Stevenson ve Stigler, 1992; Jencks ve Riesman, 1969; Shulman, 1986, 1987; Greenwald, Hedges, and Laine, 1996; Ferguson and Brown, 2000). In 1985, Lee Shulman who was the president of the Association of American Educational Researches proposed the concept "pedagogical content knowledge" in his presentation about the characteristics of the teachers.

Since that day various studies had been realizing continuously about this concept. In these studies many researchers evaluated "pedagogical content knowledge" differently and proposed that it has different compounds sürmüşlerdir (Shulman, 1987; Smith & Neale, 1989; Grossman, 1990; Marks, 1990; Fernandez- Balboa & Stiehl, 1995; Tuan, 1996; Magnusson, Krajcik, & Borko, 1999). While some of the researchers don't accept that these are not compounds of the pedagogical content knowledge, the others accept them as a sub phases of the other compounds. For example, Shulman (1987) accept only representations and students' knowledge as compounds of pedagogical content knowledge and he kept subject matter knowledge outside of the pedagogical content knowledge. In these researches the compounds of the pedagogical content knowledge are subject matter knowledge (Smith & Neale, 1989; Marks, 1990; Fernandez- Balboa & Stiehl, 1995; Tuan, 1996), representations (Shulman,

1987; Smith & Neale, 1989; Grossman, 1990; Marks, 1990; Fernandez- Balboa & Stiehl, 1995; Tuan, 1996; Magnusson, Krajcik, & Borko, 1999), knowledge about student (Shulman, 1987; Smith & Neale, 1989; Grossman, 1990; Marks, 1990; Fernandez- Balboa & Stiehl, 1995; Tuan, 1996; Magnusson, Krajcik, & Borko, 1999), knowledge about curriculum (Grossman, 1990; Marks, 1990; Tuan, 1996; Magnusson, Krajcik, & Borko, 1999), structure (Fernandez- Balboa & Stiehl, 1995; Tuan, 1996) and knowledge about purpose (Grossman, 1990; Fernandez- Balboa & Stiehl, 1995; Magnusson, Krajcik, & Borko, 1999). But representations are one of the important compounds of the pedagogical content knowledge.

According to Shulman (1987) representation is an important compound of the pedagogical content knowledge and the models, analogies, metaphors, examples, simulations, explanations, etc. used while teaching a concept involve the use of representation. In last years the number of studies about representation increased a lot. In 2000 NCTM (National Council of Teacher of Mathematics) changed mathematics education standards by opening a new title for representation. In this study we considered mainly modeling which is one of the “representation” styles in mathematics education. The concept “modeling” was perceived differently according to the sort of the realized research. Some of the researchers perceived modeling as mental modeling (Van Driel ve Verloop, 1999; Justi ve Gilbert, 2002). Another group of researcher saw modeling as a tool in the presentation of the concept. These researchers examined modeling in three parts: modeling with real life (McCrae & Stacey, 1997, Nisbet and Putt, 2000), manipulative modeling (Izsak, 2003; Wenrick; 2003; Ertle, 2006) and technological modeling (D'Ambrosio & Mewborn, 1994; Thompson, 1992; Tzur, 1999; Wenrick, 2003; Ortiz, Castro ve Rico, 2001).

All most in all studies it is determined that students had some difficulties in learning mathematical concepts and properties. They explained that the use of representations helped students to conceptualize and learn the concepts. They said that the use of modeling which is one of representation method had positive effects on learning söylemişlerdir (McCrae & Stacey, 1997, Nisbet and Putt, 2000; Izsak, 2003; Ertle, 2006; D'Ambrosio & Mewborn, 1994; Thompson, 1992; Tzur, 1999; akt. Wenrick, 2003; Ortiz, Castro ve Rico, 2001). Because of this in curriculum studies the use of representations and modeling is supported and new additions had been made in this way (NCTM, 2001; England, 2008).

In Turkey studies about teacher education accelerated since 1980. In 1998 the curriculum of the Faculty of Education had been changed and then curriculum of the primary and secondary education had been changed. The wide use of modeling was introduced in primary and secondary education. While teaching the concepts, the use of real life modeling

in the entrance to the concept, manipulative modeling and technological modeling in the teaching of the concept were required. Because of this it is important to determine the perceptions of the teachers graduated after 1998 and pre-service teachers about teaching mathematics through modeling.

Purpose and Context of this Study

The purpose of this study is to determine the perceptions of the teachers and pre-service teachers about teaching mathematics through modeling.

We will try to determine the selected pre-service teachers' perceptions about the use of modeling which is one of the compounds of the representation. Pre-service teachers (and graduated students) acquired an experience in teacher profession by the lessons school experience I, II and teaching applications. Also they were informed about the modeling, teaching methods and techniques used in mathematics education with applications in special teaching methods I and II lessons. In "Computer I and II", "Computer Programming I and II" and "Computer Algebra Systems" lessons they learned the use of software in mathematics lessons, how to prepare educational materials for teaching (flash animations) and in "developing material" lesson they developed physical materials.

So, in this study we will try to determine how they present a model of a concept that formed concept image of students' about a concept in their lessons, how they used them, how the education that they have taken in lessons change this and how their experiences in high schools effect this.

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