

Chapter 14

DEVELOPMENT OF A MATHEMATICAL REASONING SKILLS TEST: VALIDITY AND RELIABILITY STUDY¹

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INTRODUCTION

Mathematical reasoning is an activity that includes different ways of thinking (Peresini & Web, 1999). Mathematical reasoning is the basis of mathematics. Mathematical science; While teaching numbers, operations, calculations, functions, logic, geometry, derivative, integral, and many other subjects, it also teaches reasoning, making predictions, making generalizations, thinking in detail, making plans and reaching conclusions (Umay, 2003). When the history of mathematics is examined, it is understood that in ancient times, mathematical problems were not done by any formula and memorization, but simple operations were made by reasoning. The first arithmetic operation in history started with “one-to-one” activities that arise from need and give the opportunity to compare two objects easily (Erdem, 2015).

The reasoning is the way of thinking followed in order to reach a result or to produce a claim in a given task. Judgment, from another perspective, can be seen as a thinking process, a product of this process, or both (Lithner, 2008). The reasoning individual is able to think in a planned, programmed and logical way, and by making sense of the problem around the “Why” and “How” questions (Erdem, 2011). Human beings, which are distinguished from other creatures with the ability to think as required by their creation, take all factors into consideration and use the power of thought to reach a rational conclusion, examining new situations in all their dimensions, discovering them, making assumptions in logical predictions, justifying their thoughts, reaching some conclusions can

¹ This study is derived from Furkan Özdemir’s PhD dissertation entitled “Investigation of reasoning and metacognitive development of high school students on the subject of limit and continuity with model of Improve process”, conducted under the supervision of Abdullah Kaplan

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open-ended items, “Developing solution-related strategies” sub-dimension was evaluated with 4 open-ended items, “monitoring” sub-dimension was evaluated with 1 multiple choice 3 open-ended items, “Solving non-routine problems / Checking solved problems” sub-dimension was evaluated with 6 open-ended items and “Generalization” sub-dimension was evaluated with 2 multiple choices 2 open-ended items. These categories are in full compliance with the reasoning categories included in the studies conducted with the reasoning in the literature and in education curricula (Çoban, 2013; Erdem, 2015; Mason, 2001; MEB, 2013; NCTM, 2008; 2009; Pilten, 2008). In summary, it is thought that this developed scale will help determine the reasoning skills of students. In this context, it is expected to contribute to the development of alternative measurement tools for measuring reasoning skills and to new researches in this field.

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