Milan P. Milikić
University of Kragujevac
Faculty of Education in Jagodina
Department of Didactics and Methodology

UDC 37.091.3::51]:82.09
DOI 10.46793/Uzdanica19.S.255M
Received: November 25, 2022
Accepted: December 2, 2022

A CONTRIBUTION TO THE METHODOLOGY OF TEACHING MATHEMATICS

(Mirko Dejić, Milana Egerić and Aleksandra Mihajlović, *Methodology of teaching mathematics in lower grades of elementary school*, Jagodina: Faculty of Education, University of Kragujevac, 2022, 500 pages)

Methodology of teaching mathematics in lower grades of elementary school (2022) is the second edition of the textbook authored by prof. Mirko Dejić, Ph.D., retired full professor of the Teacher Education Faculty of the University of Belgrade, prof. Milana Egerić, Ph.D., retired full professor of the Faculty of Education of the University of Kragujevac and prof. Aleksandra Mihajlović, Ph.D., associate professor of the Faculty of Education of the University of Kragujevac. The first edition of the textbook was published in 2015, and the publisher is the Faculty of Education of the University of Kragujevac headquartered in Jagodina. The second edition of the textbook contains 500 pages of text within which, among other things, there are 202 pictures, with the main goal of providing readers with a better insight into the theoretical considerations and facilitating the monitoring of the presented content. In addition to the Preface, in which the authors provide basic information and emphasize its primary purpose as an educational resource for pre-service class teachers, the textbook contains eighteen chapters numbered in Roman numerals. At the beginning of each chapter, there are quotes from famous mathematicians to encourage readers to think about mathematics in a new way. At the end of the textbook, in the Literature section, the authors provide a list of 120 bibliographic items.

The first chapter, "Mathematics as a scientific discipline and teaching subject", is structured so that it consists of several sections. The aim of this chapter is to familiarize readers with the general characteristics of mathematics as a science on the one hand, and as a teaching subject on the other hand, through a review of the historical development of mathematics. Within the chapter, the authors outline the periodization of the historical development of mathematics and define the terminology used in various areas of initial mathematics education. Special emphasis

milikic.milan@yahoo.com

is placed on the subject and definition of mathematics and to what extent they are influenced by the discipline's historical development.

The content of the second chapter, "Methodology of teaching mathematics as a scientific and study discipline", is also divided into sections within which the authors provide conceptual definitions of methodology of teaching mathematics and methodology of teaching mathematics in lower grades of elementary school, differentiating the former from the latter. They define the problem and subject of the study of methodology of teaching mathematics in lower grades of elementary school and indicate its relationship with other sciences. They emphasize the connection of methodology of teaching mathematics with mathematics, pedagogy, psychology, logic, and philosophy, emphasizing the multidisciplinary character of methodology of teaching mathematics. In the last section of this chapter, the subject and goal of methodology of teaching mathematics as a discipline of study are defined, primarily focusing on the training of students for independent preparation and practical implementation of teaching mathematics in the lower grades of elementary school.

In the chapter "Psychological and logical foundations of teaching mathematics", the authors start with the definition of mathematical thinking and then present two theories (Piaget's and Vygotsky's) of the development of children's thinking, describing the main characteristics of children's thinking at each stage of cognitive development. The authors place special emphasis on the mathematical concept andthe process of its forming and definition. In addition, with numerous examples, they describe the types of mathematical reasoning and the ways of performing mathematical proofs in lower grades of elementary school.

The fourth chapter, "Analysis and explanation of mathematical concepts formed in lower grades of elementary school", refers to all contents included in the initial mathematics education. In this chapter, the authors provide a general overview of the content on sets, arithmetic, algebra, geometry, as well as content related to measurement and measures. The chapter here presents the order of study, the scope in which the contents are adopted, and reveals the specifics of the contents for which methodical transformation pre-service class teachers should be trained.

From the fifth to the eleventh chapter, the authors provide a detailed methodical transformation of the mathematical contents included in the mathematics teaching in the lower grades of elementary school. Starting from the introduction of the concept of a set, through the formation of the concept of a number, basic calculation operations, spatial relations, fractions, equations and inequalities, geometric concepts, to the procedure of measurement and familiarization with the units of measurement, the authors strive to make learning processes clearer to pre-service class teachers and all those participants involved in the educational process. Along with numerous concrete examples, which help the authors suggest ways to introduce the mentioned concepts, detailed instructions are given and all steps in

the process are explained, making it easier for students to prepare for teaching mathematics.

The aim of the twelfth chapter, "Arithmetic tasks in initial mathematics education", is to indicate the place and role of tasks in teaching mathematics. In this chapter, the authors provide a definition of mathematical problems and introduce the reader to the types and structure of arithmetic problems. The authors paid special attention to methodical guidance when solving arithmetic tasks. They state the stages involved in solving arithmetic problems and the methods that can be used to solve them.

In the thirteenth chapter, "Motivating and encouraging the learning of mathematics" a particular focus is on the use of different ways to stimulate students' interest in mathematics. In an illustrative way, with a large number of examples of tasks and mathematical and didactic games, the authors have shown how to positively influence students' motivation to discover the world of mathematics.

The content of the fourteenth chapter, "Teaching (didactic) principles in initial mathematics education", refers to the adaptation of general didactic principles to elementary mathematics teaching. The authors give explanations of the necessity of respecting the teaching principles in mathematics classes, simultaneously presenting numerous situations in which some of the principles are violated.

Within the chapter "Teaching methods and teaching systems in initial mathematics education", the authors list the types of teaching methods and describe the ways of their application in different phases of the mathematics lesson. In addition to methods, special attention is paid to familiarizing pre-service class teachers with different didactic systems and approaches. They emphasize problem-based and programmed learning/instruction, differentiated learning, project-based learning, integrative teaching approach and active learning/teaching. Each of the teaching systems is described in detail by the authors through concrete examples of application in elementary mathematics education.

The sixteenth chapter, "Organization and implementation of initial mathematics teaching", shows as its primary goal the process of familiarizing pre-service class teachers with the process of planning, preparing, and implementing mathematics lessons. In this chapter, the authors state clearly and concisely the types of lessons, describe the forms of work in the mathematics lesson, as well as the kind of structure the lesson should reflect. Through this chapter, the authors also aim to equip students for self-reflection on the lesson held and methodical analysis of the mathematics lessons of other students. Important parts of this chapter include the sections on the approaches to organizing extracurricular work and the way of working in combined classes, in which the authors demonstrate the basic principle of working in such classes with an example of instruction.

In the seventeenth chapter, "Assessment and evaluation of the students' work in mathematics teaching", the types, functions, and criteria of assessment and evaluation are listed. In this chapter, the authors give specific proposals and

suggestions for how and on what the students should be evaluated. Also, the authors present some examples of standardized tests and tests with tasks at different levels of educational achievement for certain thematic units in order to make it easier for pre-service class teachers to independently create such tests.

In the last, eighteenth chapter, "Examples of lesson plans", there are models of mathematics lesson plans that should facilitate and prepare students for planning, preparing, and conducting lessons in practice schools.

In the textbook *Methodology of teaching mathematics in lower grades of elementary school,* the authors uniquely provide guidelines to understand the problem of systematic methodical education of pre-service class teachers. With numerous examples and detailed methodical guidance in a graphic and simplified way, they make the readers better understand the importance of adequate skills for teaching mathematics at the earliest school ages. At the end of each chapter, the authors provide a large number of questions and tasks for independent work, thus enabling pre-service class teachers to research further and look for new solutions. Additionally, at the end of each chapter, there are instructions on which tasks in the workbook (Practicum) should be done to better understand the content presented in the corresponding chapter.

On the basis of everything previously stated, we can conclude that the textbook *Methodology of teaching mathematics in lower grades of elementary school*, authored by prof. Mirko Dejić, Ph.D., prof. Milana Egerić, Ph.D., and prof. Aleksandra Mihajlović, Ph.D., represents an important contribution to the methodology of teaching mathematics.