

**SUMMARY OF PUBLICATIONS FOR THE VACANCY OF „PROFESSOR“
IN THE PROFESSIONAL FIELD 1.3. PEDAGOGY OF TEACHING IN...
(METHODOLOGY OF TEACHING IN MATHEMATICS IN PRIMARY CLASSES)
OF THE CANDIDATE ASSOC. PROF. GABRIELA KIROVA PhD**

INDICATOR B 3 Habilitation book – Monography

- 1. (1) Kirova, G. (2021). The training of students, future primary teachers, to work with word problems in mathematics. Sofia, VEDA SLOVENA-JG, ISBN 978-954-8846-68-4, COBISS.BG-ID 48984072, 326 p.**

Abstract: A monograph on the awarding of the academic position of “professor” devoted to the issue of preparing students, future primary school teachers, for methodologically correct work on the formation of primary school students’ competence to solve word problems.

Structurally, the book contains the following elements: Chapter one: The issue of word problems in teaching mathematics in primary school; Peculiarities of thinking in primary school age and importance of mathematical training; The word problems in the teaching of mathematics in the primary grades; State of the issue in practice – Analysis of observed 80 lessons in mathematics in Sofia primary schools in the period 2010-2016, giving results and outlining typical mistakes made by current primary school teachers when working with word problems.

Chapter Two: Methodology of experimental training with students, future primary teachers; Didactic model for working with word problems in the experimental training for working with word problems in the primary grades, including three components: theoretical preparation – content of lectures and video lectures on the topic; methodically correct elaboration of all 859 word problems and creative exercises in the mathematics textbooks of KLET Bulgaria publishing house, Anubis brand; author’s models for illustrating the different types of word problems (70 models).

Chapter three: Result analysis of the experimental training with students, future primary teachers, including the profile of the participants covered in the study; research of the attitudes and relations of the participants in the experimental training regarding the word problems as an element of the mathematical learning content (input and output level); research of the acquired competence for methodically correct work with word problems in mathematics with students from I – IV grade (input and output level); attitudes of the surveyed persons for realization in the profession of primary school teacher and self-assessment of the professional competence for training of primary school students in solving word problems (input and output level)

The book has a volume of 319 standard pages of exposition and 7 pages of cited literature.

The content includes: 39 diagrams, one table and 65 diagrams.

INDICATOR D 6 Articles and reports published in scientific journals, referenced and indexed in world-famous databases of scientific information

2. (1) **Kirova, G. (2021) Opportunities for formation of mathematical competence through the subject "Finding an unknown subtrahend" in the new math textbooks for the fourth grade. Yearbook of the University of Shumen "Bishop Konstantin Preslavski", Faculty of Pedagogy, Volume XXV D, Veliko Tarnovo, Faber, University Publishing House "Bishop Konstantin Preslavski", 2021, 142 - 155, ISSN 1314-6769 (indexed in CEEOL)**

Abstract: From the 2019/2020 school year in Bulgaria, the mathematics education in the fourth grade is realized with seven new mathematics textbooks. This article will present a comparative analysis of the methodology of introducing the topic "Finding an unknown subtrahend" in these seven textbooks. The different approaches of the authors will be explored and conclusions will be drawn on this basis.

INDICATOR G 7 Articles and reports published in non-peer-reviewed peer-reviewed journals or published in edited collective volumes

3. (1) **Kirova, G. (2021). Opportunities for the formation of mathematical competence through the topic “Finding an unknown divisor” in the new mathematics textbooks for the fourth grade. In the collection The Competence Approach in Education - Traditions and Innovations, Shumen, UP “Bishop Konstantin Preslavski”, Print: ISBN 978-619-201-522-0, Online: ISBN 978-619-201-523-7, p. 21 - 44.**

<https://www.shu.bg/wp-content/uploads/file-manager-advanced/users/faculties/pf/izdaniya/topo-punup/2021-kompetentnost.pdf>

Abstract: The research was funded by the “Competence Approach in Education – Traditions and Innovations” project RD-08-120/03.02.2021 from the budget subsidy of Bishop Konstantin Preslavsky Shumen University.

This article presents a comparative content-analysis of the new Bulgarian mathematics textbooks for fourth grade. These new textbooks are used for the first time by teachers starting from the 2019/2020 school year. All seven textbooks analysed are based on the fourth grade mathematics curriculum and in this sense they are not alternative but variant textbooks. However, in them, the author teams have proposed different methodological approaches in developing the topic “Finding an unknown divisor” (new knowledge lessons), which will be the subject of analysis here. Fourth graders’ mastery of this curricular content is an important component of general mathematical competence, and for this reason, the opportunities provided by each of the seven fourth grade textbooks are of scientific interest.

4. (2) **Kirova, G. (2020). Opportunities for implementation of the competence approach in teaching in mathematics in the fourth grade through project work. Yearbook of the University of Shumen "Bishop Konstantin Preslavski", Shumen, University Press, Volume XXIV D. ISSN 1314-6769, pp. 209-214**

Abstract: This article presents the possibilities for realization of the competence approach in the teaching of mathematics in the fourth grade. Working on a project is one of the most successful ways to develop key competencies in students. It is related to group work and implementation of independent research activities. Through project work, communication skills, skills for working with Internet sources, presentation skills are developed. The whole activity is subordinated to the possibilities for composing and solving text tasks with the collected data. The knowledge of the fourth grade students enriched and expanded.

5. (3) **Kirova, G. (2019). Types of electronic resources in electronic textbook of first grade mathematics. Knowledge International Journal, V 34.2., Skopje. ISSN 2545-4439 (Global Impact and Quality Factor 1.822 (2017)), p. 483-489**

Abstract: Since 2015, educational reform has been implemented in Bulgaria. It was initiated with the entry into force of the new Preschool and School Education Act. On the basis of this law, new curricula were adopted in all subjects, including elementary classes in mathematics. Mathematics kits for elementary classes, along with textbooks, study notebooks, a teacher's book already include electronic readable textbooks and e-textbooks. "Electronic Readable Textbook" is an electronic product whose content is exactly the same as the content of the approved textbook created as a print edition. The e-textbook is an electronic product that contains additional electronic resources to the individual development of lesson topics, such as tasks, exercises, tests and more. This educational content enables modern students, aged 7-10, to work with electronic resources independently or under the guidance of a teacher, to reflect and consolidate mathematical knowledge and skills, to develop their digital skills, to increase their interest in mathematics. Modern academic preparation for elementary teachers should also include such theoretical and practical knowledge, skills and competences for working with electronic textbooks and with the electronic resources in them. The purpose of my research is to make an analysis of the content included in the electronic textbook for mathematics for the first grade of the Anubis publishing brand of the publishing house KLETT – Bulgaria. On the basis of this analysis, methodological guidelines will be developed for working with the different types of electronic resources, which will become part of the academic preparation of the pedagogical students in the university discipline "Didactics of mathematics in elementary classes". A survey of 165 pedagogical students in bachelor's and master's degree on their opinion on e-textbooks conducted this year has yielded interesting and revealing results that confirm the need for updating their academic training in the field of e-textbooks. The majority of respondents believe that primary teachers should use e-books in their work – 83%. When asked which subject is most appropriate to use e-textbooks, mathematics ranks immediately after the natural and social sciences, with 58.4% of the respondents citing it as the most appropriate subject for applying e-textbooks. At the same time, one third of respondents (33.1%) said they did not feel prepared to work with e-books. Of all those surveyed, 81.4% believe that it is necessary to include preparation for work with

e-textbooks in university courses in private didactics. This gave me reason to head to the topic of this article and to make a content analysis of an electronic first grade mathematics textbook by classifying the types of additional electronic resources in it.

6. (4) **Kirova, G. (2019). Survey of results of mathematics education at the end of the first grade. Yearbook of Sofia University, Volume 111, ISSN 2682-9622, COBISS.BG-ID - 45499144, pp. 102 - 121, 238 p.**

Abstract: The mathematical knowledge of primary school students is fundamental and of great importance for further successful math education in the next classes. These knowledge and skills determine the key competencies needed in every person's life. Therefore, it is important to measure the learning outcomes of mathematics at the end of each class. The research I present here was conducted in May 2017 and covered 406 students from 5 schools in Sofia. Toolkits and indicators for verifying the knowledge and skills in mathematics at the end of the first grade were developed. A detailed analysis of the results for each of the test tasks is done. Conclusions and recommendations were formulated.

7. (5) **Kirova, G. (2019). Mathematics from the world of football. In Proceedings of the International Scientific Conference "Contemporary Trends in Physical Education and Sports", Sofia, IM "St. Kl. Ohridski ", ISSN 1314-2275, pp. 359 - 365**

Abstract: Since 2015, with the adoption of the Law on Pre-school and School Education, educational reform has started in Bulgaria. It touched on the aims of education as well as its content. This reform in the field of primary education has a dominant feature - the formation of key competences as a guiding goal. One of the possibilities for realizing this new goal is to include more cross-curricular links, break down rigorous subject-based learning, address the content and lesson activities to the overall personality of 7-11 year-old students with their interests, attitudes and values. This article will offer ideas for methodical development of text tasks for elementary school age based on numerical data (information) from Internet sources on the topic "Football".

8. (6) **Kirova, G. (2019). Methodological approaches in the development of the section "Tabular multiplication and division" in the new textbooks in mathematics for second grade. Yearbook of the University of Shumen "Bishop Konstantin Preslavski", Shumen, IM "Ep. Konstantin Preslavski ", volume XXIII D. ISSN 1314-6769, pp. 206-220, 1075 p.**

Abstract: From the 2017/2018 school year in Bulgaria, the mathematics education in the second grade is realized with nine new mathematics textbooks. This article will present a comparative analysis of the methodology of introducing the topic „Multiplication and

division“ in these nine textbooks. The different approaches of the authors will be explored and conclusions will be drawn on this basis. Based on the comparative analysis, the advantages and disadvantages of the nine textbooks are presented.

9. (7) Kirova, G. (2019). Fourth grade project “Sofia – capital of Bulgaria”, Knowledge International Journal, Vol. 31.2, Skopje. ISSN 2545-4439 (Global Impact and Quality Factor 1.822 (2017)), p. 539 – 542

Abstract: In the on-going educational reform in Bulgaria, the focus is on the formation of key competences in students. Mathematical competence is one of them. Mastering basic mathematical knowledge in primary grades remains a priority. At the same time, the new mathematics curricula explicitly include such specific skills as practical problem solving, teamwork skills, independent search for information from different sources, project work, etc. In my research work in recent years, I have been experimentally trying out various ideas of my own for project work with primary school pupils. In this publication I will present my concept for the project “Sofia - Capital of Bulgaria” for fourth grade students. It will integrate mathematical knowledge and skills with knowledge of Man and Society and a number of components of civic education. The mathematical knowledge and skills will include: addition and subtraction of numbers over 1000 without passing, finding the unknown diminutive, solving numerical expressions with and without parentheses, units of measurement (meter, gram, kilometre, centimetre). From Knowledge and Skills in Man and Society (Man and Society Curriculum for Fourth Grade at <https://mon.bg/bg/2190>) the topic “Sofia - modern capital” and the related competences (tells about the location of the capital of Bulgaria with the help of a map; recognizes by an image famous cultural monuments and natural features of the Bulgarian capital; connects important landmarks of the capital with the historical epochs to which they belong; understands the importance of the capital as a modern administrative centre of the country). Working on this project, the fourth grade students will also acquire the following competences: digital competence (using information in electronic form to prepare short presentations on geographical, historical, cultural topics; using electronic presentations as a source of information about events and personalities), learning skills (working with maps and reference literature – reference books, children's encyclopaedias, extracting information about the past and the present from illustrative material; searching for information on a particular problem from written documents in the textbook); social and civic competences (solving accessible problem situations requiring listening, presenting personal point of view and defending own opinion; collecting curious facts about popular personalities or events from Bulgarian history; making albums with personal photos from visiting cultural, historical and natural sites; making tables about holidays of different communities – religious and ethnic; creating projects on a historical or geographical topic studied; visiting a municipality, town hall, the National Assembly, etc.); cultural competence and skills of expression through creativity (making albums with drawings from exhibits of visited museums; observing natural and historical sites; making group presentations about selected natural sites). One of the distinctive features of the project activities with primary school pupils is the integrative nature of the project activities. The project presented in this article on “Sofia – Capital of Bulgaria” is suitable for the first term of fourth grade. It is a medium-term project lasting one or two months. It ends with an open mathematics lesson (one or two lessons) during which the

students solve mathematical and practical problems and present the results of their preliminary project work (the preliminary activities on the project topic). The project tasks are of three types: individual, group and class-wide. Each student is given all three categories of assignments to complete. It is the teacher's task to prepare and allocate the individual, group and class-wide tasks, to set the deadlines for the students' commitments, and to monitor the completion of the tasks on an on-going basis.

10. (8) Kirova, G. (2019). "The room of mysteries" project for the third grade, International scientific conference: Knowledge without borders, Knowledge International Journal, Vol. 30.2, Skopje. ISSN 1857-4439 (Global Impact and Quality Factor 1.822 (2017)), p. 423-426

Abstract: One of the important components of mathematical competence is the ability to solve practical tasks. Through learning in each of the subjects, key competence learning skills are acquired, which includes understanding the personal needs in the learning process and discovering the opportunities and abilities to overcome learning difficulties, both individually and in groups; critical thinking, problem solving and decision making, initiative, creativity, responsibility, teamwork, and other key competences specified in the curriculum. The ability to solve practical tasks develops to a greater extent in group, teamwork on projects. Project work is one of the active learning methods. It is not widely accepted in modern mathematical education in Bulgaria. The reasons for this are many. One of them is the lack of methodological literature on the subject for elementary teachers. Many specialists organize project work with their students, including mathematics, but their experience remains unpopular. Project work is difficult to organize, involves serious planning, and often involves spending money to buy the necessary materials. To successfully integrate into project activities, it is necessary for the young students to have a certain degree of autonomy, organizational skills, communicative skills, teamwork skills, skills for individual search of information, presentation skills, and so on. Teachers with creative abilities and innovative ideas develop, organize, and work on projects in primary school but this is a matter of their goodwill and professional skills. Mathematics teaching specialists in primary schools are in debt to primary school teachers in terms of published methodological work and project activities, including mathematics. Teachers' books for mathematics curricula for primary classes should include developments of at least one class project. This is done in the Bulgarian mathematics training kits of Anubis Publishing House, where I am the author. In this article I will present a description of the project – Thematic Classroom "The Room of Mysteries" for the third grade. It would be good the lesson to be held at the end of the school year. It solves tasks from all of the learning content studied in mathematics in the third grade. The idea of the project is based on the so-called "Escape Room" – a place where participants have to solve a series of puzzles to leave the room. Students of the class will not be locked in their classroom, of course. They will find a locked suitcase in their room that they want to unlock to see what's in it. For better motivation students will be given the role of police inspectors, who will be divided into 6 teams to solve a series of challenges – tasks. The lesson is held in the presence of parents and relatives of the students. A team of "veteran investigators" is formed from the parents, who also have to solve puzzles. Solving each task will lead to the opening of a new puzzle, and so pupils and parents will have to deal with a series of challenges that will lead to the discovery of 7 keys, identical at first glance, only one of which unlocks the briefcase. The prize, hidden away from the students, may be their annual third-grade certificates, may be holiday books for the end of the year as well as small gifts.

Materials required for the project are purchased in advance with funds collected from students' parents.

- 11. (9) Kirova, G. (2018). Opportunities for realization of the competence approach in the teaching of mathematics in the third grade. Yearbook of the University of Shumen "Bishop Konstantin Preslavski", Shumen, University Press, Volume XXII D. ISSN 1314-6769, pp. 163-169**

Abstract: In the new mathematics curricula for primary classes, the focus is on building competencies. This article will address the issue of the possibilities for realizing the competency approach in math education in third grade. Examples of project work and other ways of working will be given. Particular attention will be paid to map orientation and solving of text tasks in numerical data in tables. An example will be the Mathematics textbook of publisher Anubis 2018 with authors T. Vitanov, G. Kirova, Z. Sharkova, I. Pushkarova and D. Parusheva.

- 12. (10) Kirova, G. (2018). Metodological problems of primary teacher`s work with problem solvings on mathematics. Yearbook of Sofia University, Volume 110, ISSN 0861-8216, COBISS.BG-ID - 47117832, pp. 55 - 67, 117 p.**

Abstract: On of the importat elements of the curricula in mathematics in primary school are text problems. For the successful training of students in the following degrees it is crucial for them to adsorb the ability to solv text problems. The fact is that the text problems are difficult for a large percent of students in primary grades in Bulgaria. This article will examine the main causes of the difficulties with text problems. One of them is the methodologically incorrect work of the primary teachers themselves. For the basis of this article are used monitored and recorded 80 lesson in mathematics in primary classes in 3 different schools in Sofia, Bulgaria. The observations were made during 2010 – 2016 by the author of the article.

- 13. (11) Kirova, G. (2018). Work on a project in the second grade, International scientific conference: The teacher of the future, Knowledge International Journal, V 23.1., Skopie. ISSN 2545-4439 (Global Impact and Quality Factor 1.822 (2017)), p. 131-136**

Abstract: In the light of the ongoing educational reform in Bulgaria, the competence approach emerges. The educational objectives, including those for the initial stage of the primary education, are oriented towards creating conditions for formation of key competences in the students of I to IV grades necessary for their successful education in the next stages of education and in life. These competences include both mastery of basic mathematical knowledge and skills, as well as more transversal skills such as independent research, mastering teamwork skills, managing information from different sources, working on

projects, and more. In my previous large-scale study of the interests and values of pupils of primary school age it was found that there are some constant elements from the circle of interests and preferences of modern Bulgarian children at the age of 7-11 and part of them are the preferences for the world famous and unforgettable tales, novels and movies for children. In connection with these research results, yet in the 1990s, we published the handbooks “Mathematics from the Fairy World” for the first and second grade and “Mathematics in the world around us” for the third grade. This article presents experimental work with students from the second grade in the school year 2017/2018 under the project “Mathematics from the Wonderful Disney World”. It was of interest to us how modern 8-year-old children would accept the combination of learning tasks with the stories and characters of Walt Disney films. The project work started by exploring the interests of the students themselves. A poll of data on favourite films of second grade students was collected. After processing the poll results, a list of 16 titles of classic and newer films by Walt Disney was obtained. The students were given the task of watching those movies from the list of favourite titles they had not yet seen (*Zootopia*, *Princess and the Frog*) or they had already forgotten, *Alice in the Wonderland* (created in 1923). Another element of preparation is the study of a class-preferred song from the movie *The Beauty and the Beast*, Gaston's song. For the purpose of the training, 14 problems were compiled, including content in Mathematics (basic), Reading, Bulgarian language, English language, Fine Arts and Home and Appliances. The problems were richly illustrated and the scrolls for students were copied in colour. The 3-hour thematic class of *Mathematics from Wonderful Disney World* with second grade students passed with great success, in great interest, positive emotions and high activity by the students. At the end of the project, each student completed a self-assessment card in which he/she reflected his/her opinion on the problems and his/her presentation in the lesson, as well as their desire for further such thematic lessons.

14. (12) Kirova, G. (2018). Options for compiling word problems with tabulated numerical data, International scientific conference: Knowledge without borders, Knowledge International Journal, V 22.2., Skopje. ISSN 1857-4439 (Global Impact and Quality Factor 1.822 (2017)), p. 391-394

Abstract: In the light of the current educational reform, the focus of objectives, including of mathematics training, has been shifted. Initial learning process is realized on the basis of the approved new curricula for the first and second grades, the third-grade study documentation is being prepared and the fourth-grade curriculum is due to be finally adopted. Mathematics training in the initial stage of the primary education is already competence-oriented. At the end of the fourth grade students are expected to have basic mathematical knowledge and skills, but also key mathematical competence and key competences in the field of natural sciences and technologies. This is intended to be done through a number of activities such as: searching, collecting and processing information when creating a task; modelling of practical situations with numbers and arithmetic actions; modelling mathematical models of specific life situations by compiling word problems ...; retrieving information from different sources (illustrations, drawings, tables, specific didactic material, text, measurement, web, etc.); searching for information (data) from the Internet for the compilation of a mathematical task;

developing, enrolling, realizing and evaluating thematic projects in the frames in which the mathematics and other curriculum content is applied, built and formed.

The realization of these and other similar activities by the students is also related to the work with tabulated numerical data, the use of pre-fabricated albums with numerical data or demonstration boards with interesting and curious numerical facts; that boards being exposed in the classroom. Another possible approach is to assign short-term research tasks to students in the fourth grade for Internet research and to collect the necessary numerical data on the basis of which a project is being developed or text-based problems are drawn up and solved in obligatory or free math studies.

By reviewing the text-based self-writing exercises by primary school students in mathematical textbooks operating until 2016/2017, trends are emerging that give rise to important conclusions for new training kits. The lessons to be learned are that in the previous training kits, the number and distribution of tasks for composing word problems are of different numbers and of different types. The article also presents the results of a comparative analysis of the approved and introduced in the mathematics training in first and second grade new textbooks created under the new curricula. And there is a significant imbalance in the number and types of tasks for compiling problems in different authors' collectives. There is no systemic and methodical consistency. The paper presents opportunities for compiling word problems with numerical data in tables. The information in these tables is related to some European countries (Bulgaria, Serbia, Slovenia, Italy, Switzerland, France, Liechtenstein, Austria, Croatia), as well as cities, rivers, lakes etc. in these countries.

15. (13) Kirova, G. (2017). Classification of types of creative exercises with word problems. Yearbook of Sofia University, Volume 108, ISSN 0861-8216, pp. 49 - 66, 246 p

Abstract: This paper presents a classification of creative math problems practices in primary education (1. – 4. Grade). The classification consists of five types of practices: complement of word problems; simple research on word problems; solvig word problems by two different approaches; transforming of word problems and creating word problems. In the paper many examples of individual practices are given. The aim of such type of practices and their place in the learning process are discussed.

16. (14) Kirova, G. (2017). Problems with no bounds in teaching mathematics at primary school, International scientific conference: Knowledge without borders, Knowledge International Journal, V 16.2., Skopje. ISSN 1857-92 (Global Impact and Quality Factor 1.822 (2017) p. 699 – 701

Abstract: The curriculum of mathematics for the initial stage of the basic educational level is relatively constant for the past 35 years. The only visible trend in educational reforms of 2000 and 2015 is to simplify the material, dropping out the traditional Bulgarian elementary school substantive topics in mathematics and minimal redistribution of content for individual classes. In the process of implementation of the ongoing reform, an opportunity was missed for global understanding of trends in mathematics educational content for primary classes in Europe, USA and other developed countries. The change realized in approved and enacted new curricula for the first and second grade is symbolic. The topic of forming concepts of numbers

30, 40, 50 ... 100 and the operations addition and subtraction with them was transferred from second grade at the end of first grade. That is all. In theoretical terms we are talking about the formation of key competencies through training in mathematics. How an old educational content will form new key and transversal competences, important to the child throughout his future life, remains unclear. In 2015 for the first time Bulgaria was included in an international research of achievements in mathematics and natural sciences TIMSS. The results in mathematics for students completing fourth grade were encouraging, but again they clearly highlighted the large gap between the curriculum in Bulgaria and other countries around the world, causing Bulgarian students not being able to deal with one part of the test problems in international studies. The only reason is that this educational content or these types of mathematical problems do not occur in Bulgarian textbooks in mathematics. To overcome this vacuum in 2015, my colleague from the University of Plovdiv Zlatina Sharkova and I, we created the textbook "Problems with no Bounds" in order teachers to be able to prepare their fourth-graders for the upcoming international study TIMSS, and other similar international format math competitions. This article will present the areas of educational content, which are developed in this textbook in addition to the classical educational content in mathematics for elementary schools in Bulgaria. Each topic is presented through sample problems, and the guide for teachers making an integral part of the textbook "Problems with no Bounds" gives guidance for a methodology to work with the types of problems.

17. (15) Kirova, G. (2016). Methodology of work with inverse problems in the primary school. Yearbook of Sofia University, 2016, Volume 109, ISSN 0861-8216, pp. 135 - 146

Abstract: This article examines the problem of working with word problems in an indirect form in the primary grades. Here is made a content analysis of this type of educational content in the textbooks of mathematics. Presented experimental study was conducted with students from fourth grade from Sofia. The results of this study are presented. Formulated conclusions are important about the practice of teaching mathematics.

18. (16) Kirova, G. (2016). Venn diagrams and Carol diagrams in primary school math education. Innovations in learning and cognitive development. In the electronic magazine: Educational Technologies, Burgas, no. 7., ISSN 1314-1791, _c. 131 - 133

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Abstract: This report presents opportunities for the application of Venn diagrams and charts Carol learning in primary grades. The exercises in analysis and classification are of great importance for the development of the thinking of students from I to IV grades. Such exercises are absent from Bulgarian textbooks in mathematics. Tasks for completing and creating the Venn diagrams and charts Carol found in textbooks of mathematics in many countries in Europe (UK) and the United States. The report will be presented several examples of tasks. Primary school teachers can create their similar tasks and apply them in the teaching of mathematics in primary school.

19. (17) Kirova, G. (2016) Calculus approximation in mathematics education in primary grades. In the collection The Modern School and Teacher Education, Sofia, UP "St. Cl. Ohridski ", ISBN 978-954-07-4105-5, pp. 241 - 246

Abstract: Current trends in primary mathematics education in Europe are oriented towards the formation of mathematical literacy. Elements of literacy are individual mathematical competences. Despite some specificities in the formulation of these competences, one of their unconditional components is the practical applicability of the mathematical knowledge studied in everyday practice or in close-to-practice learning situations. In this sense, approximate calculus turns out to be a key skill. This paper argues for the inclusion of such tasks in the mathematics curriculum in our country and proposes a system of various exercises related to this particular competence. Links of calculus approximation to key sections of the curriculum, such as the topics of natural numbers, arithmetic operations with natural numbers, and the relationships between changes in components and results in arithmetic operations, are highlighted.

20. (18) Kirova, G. (2016) Pie chart problems in mathematics education in primary grades. In the collection The Modern School and Teacher Education, Sofia, UP "St. Cl. Ohridski ", ISBN 978-954-07-4105-5, pp. 265 - 269

Abstract: The mathematics curriculum for primary grades does not include problems with pie charts. The third grade mathematics curriculum provides for the study of the concepts of halves, thirds, fourths, fifths, and tenths. This knowledge is introduced on the basis of dividing a whole number into equal parts. In developed European countries, the study of ordinary fractions, fractional numbers, comparison of ordinary fractions and operations with fractions has long been an element of the mathematics curriculum for primary school age. This significant discrepancy in curriculum content between Bulgaria and European countries is one of the reasons why our students cannot perform equivalently in a number of international surveys, such as TIMSS. This paper presents one type of learning content, namely pie chart problems, which could find its place in primary school-age mathematics education in our country. These problems are related to the representation of different ratios graphically.

- 21. (19) Kirova, G. (2016). Problems solving with schedules and time tables in teaching mathematics at primary school. Yearbook of the University of Shumen "Bishop Konstantin Preslavski", Shumen, University Press, Volume XX D. ISSN 1314-6769, pp. 202-206**

Abstract: In the educational content in mathematics for primary classes of many European countries and the United States (France, Germany, Great Britain, Greece, etc.) are included orientation tasks timetables and schedules, as well as solving problems in numerical data schedules. These tasks have practical character. This is the reason here to examine the question of the inclusion of such tasks and exercises compulsory and optional courses in mathematics in primary school in Bulgaria.

- 22. (20) Kirova, G. (2016). How to create text problems using numeric data from newspapers, International scientific conference: The Power of Knowledge, International Journal Knowledge, V 14/1, Skopje. ISSN 1857-92, (Global Impact and Quality Factor 1.322 (2016)) p. 369 – 372**

Abstract: Mathematics is all around us. We are surrounded by numeric data. It is in the media, on the television, in the newspapers, in the magazines, in the encyclopedias, in the price lists, in the transport schedules, in the menu at the restaurant and in many other places. Often with such numeric data we make mathematical calculations in mental plan. In fact, this is solving mathematics' text problems. Currently in Bulgaria is in progress an educational reform. From the academic year 2016/2017 the curricula in mathematics for first grade are going to be introduced. The program for second grade is approved and the curriculums for third and fourth grade have been published for discussion and are soon to be approved. The new concept of the reform is to prepare the young people for life. Leading is the acquisition of key skills (competencies) to serve the person in his/her whole life. In this respect it is provided for mathematics from primary school to give student skills to work with numeric data, to process numerical information, to compile and solve text problems from self-collected data. This article will present work methods for creating text problems using numeric data from newspaper. For example is used the Bulgarian daily newspaper - "19 minutes". Below are the results of an experiment with students from fourth grade held in the month of May 2014 in Sofia, Bulgaria. In this experiment students make up word problems using data from: newspaper, children's encyclopedia Guinness Book of Records, statistical handbook of the Republic of Bulgaria and roadmap. The results of the experiment are positive.

- 23. (21) Kirova, G. (2015). Creation of word problems for primary school, based on numerical data from various sources. Yearbook of Shumen University "Ep. Konstantin Preslavski ", volume XIX D, ISSN 1314-6769, pp. 321-327**

Abstract: This article present methodological ideas of creation word problems for primary grades based on numerical data from different sources. Presented is the author`s many years of experience in working with students of pedagogical specialties in an elective course on this issue. Affected are compilation of word problems on numerical data from: tray-price lists, from children's encyclopedias, from newspapers, from Book of Records "Guinness", from

road map (atlas), from statistical handbook, from Internet resources, from self-collected prices of goods and services.

- 24. (22) Kirova, G. (2015). Map orientation. International scientific conference: Knowledge For Capabilities & Skills, International Journal Scientific applicative papers, V 11/1, Skopje, 2015. ISSN 1857-92, p. 370 - 373 (Global Impact and Quality Factor 1.023 (2015))**

Abstract: One of the important skills that a person uses in their daily lives is guidance on the map or using a map and plan – map orientation. Important are: orientation in space; knowledge of directions; interpretation of various symbols, which mark various objects in maps and plans; the level of development of spatial thinking of man. These skills are lacking in many adults. Such competence is transversal. In this article I will present a system of problems and their solutions. These are ideas to include guidance on the map as an interdisciplinary topic in mathematics education for primary school. These tasks are appropriate for 10-11 years old students – from fourth grade in the Primary School in Bulgaria.

- 25. (23) Kirova, G. (2015). Data tables in mathematics education in primary school. International scientific conference: Knowledge – capital of the future, International Journal Scientific and applicative papers V 10/1, Skopje, ISSN 1857-92, p. 168-170 (Global Impact and Quality Factor 1.023 (2015))**

Abstract: In Bulgarian mathematical primary education there are not the word problems about searching information and then filling the tables with data. Such word problems exist in mathematics textbooks in many European countries. In mathematics textbooks for the first grade in the United Kingdom there are the tasks for collecting and expressing the numerical information from the students themselves. By responding to various questions relating to these data, the students solve the different problems. In this article I will present various opportunities for entering tasks to fill the data tables in Bulgarian primary school education.

INDICATOR G 9 Studies published in non-peer-reviewed peer-reviewed journals or published in edited collective volumes

- 26. (1) Kirova, G. (2021) Visualization in math education in I – IV grade. Education and the Arts: Traditions and Perspectives, ISSN 2738-8999, pp. 232 – 253**

https://fnoi.uni-sofia.bg/wp-content/uploads/2021/11/Sbornik_Obrazovanie_Izkustva_2021.pdf

Due to the abstract nature of mathematical knowledge, it is extremely important to apply rich visualization in the education of students from I - IV grade. It is known that students aged 7-10 years are characterized by a developed predominant concrete-image thinking and an initial stage of development of logical thinking. There are no individual didactic materials available in the equipment of the classrooms of the students from the initial stage of the basic educational degree, which distinguishes the Bulgarian primary education from that in other European countries. The study of the mathematical concepts of natural numbers, the skills of the arithmetic operations of addition, subtraction, multiplication and division, the geometric content - the study of geometric figures and bodies, the study of units of measurement, etc., need a rich visualization. For many years in Bulgaria there is a practice for textbooks in mathematics for first and second grade to have cardboard applications with didactic materials - models of geometric shapes, tangram, clock model, models of banknotes and coins and others. In my research conducted in 2015, I found that in practice, the vast majority (80%) of primary school teachers do not work with this didactic material. The reasons they cite are completely unacceptable. Since 2015, with acceptance of the new Law on Preschool and School Education, educational reform has started in Bulgaria. Gradually, from the 2016/2017 school year, new teaching sets in mathematics for I, II, III and IV grade were introduced in mass practice. In the present work, as the author of text books, I will present a system of methodical exercises for visualization with the individual didactic materials, printed in the special notebooks № 3 "Didactic materials" to the teaching sets of PH KLET-Bulgaria, ANUBIS brand for first, second and third grade, as well as with the applications to the textbook № 1 and the textbook № 2 in mathematics for the fourth grade of the same publishing house.

27. (2) Kirova, G. (2020) Methodological aspects of the new textbooks of mathematics for first grade. Yearbook of Sofia University "St. Kl. Ohridski ", Faculty of Educational Science and The Arts, vol. 113, ISSN 2683-1074, pp. 88-122

Abstract: The mathematical knowledge of students in the first grade is fundamental to the formation of their mathematical competence. Since 2016 in Bulgaria, the first class mathematics education has been completed with nine new training sets of different publishing houses. From a methodological point of view, it is a scientific interest to analyze and compare these variant textbooks. The present study includes a comparative analysis of the current nine classics mathematics textbooks in several important methodological aspects: the development of the natural numbers up to 10 themes, the addition and subtraction of numbers up to 20 with the passage of the decimal, the geometric content and the text tasks. At the end of the thesis, conclusions are drawn.

28. (3) Kirova, G. (2019). Methodological aspects of the new textbooks of mathematics for second grade. Yearbook of Sofia University "St. Kl. Ohridski ", Faculty of Educational Science and The Arts, vol. 112, ISSN 2682-9622, pp. 102-132

Abstract: The mathematical knowledge of students in the first and second grades is basic for the formation of their mathematical competence. Since 2017 in Bulgaria, the second grade mathematics education has been completed with new nine educational sets of different

publishing houses. From a methodological point of view, it is of scientific interest to analyze and compare these variant textbooks. The present study includes a comparative content analysis of the current nine second-grade mathematics textbooks in several important methodological aspects: the development of topics for natural numbers from 21 to 100 themes, for the addition and subtraction of numbers to 100, for multiplication and division of number to 100, for finding unknown component, for geometric content and for text tasks. At the end of the development conclusions are formulated.

INDICATOR E 20 Published university textbook or textbook used in the school network

29. (1) Kirova, G. (2021). Current problems of the didactics of mathematics in the primary grades. Sofia, VEDA SLOVENA-JG, ISBN 978-954-8846-65-3, 536 стр., COBISS.BG-ID 47920136

Abstract: The book is devoted to important topics in the didactics of mathematics in primary school. It elaborates in detail the main issues of mathematics education in the initial stage of the basic educational degree in accordance with the current mathematics curricula for I, II, III and IV grade: purpose and objectives of mathematics education in I – IV grade; content of mathematics education in primary school; the math lesson in the elementary grades; measuring the results of mathematics education; differentiation and individualization in mathematics education; project training in mathematics in the primary grades; methodology for studying natural numbers; methodology of studying the actions of addition and subtraction; methodology of studying the actions of multiplication and division; methodology for studying the properties of arithmetic operations; methodology for studying the finding of an unknown component in arithmetic operations; dependences between the changes of the components and the changes of the respective results in the arithmetic operations; methodology of working with word problems in primary school; creative work on word problems in mathematics; methodology for studying geometry and units of measurement; visualization in mathematics education; continuity in mathematics education in the preparatory group and in the first grade; current aspects of mathematical learning content. In each topic a special place is given to the methodological mistakes made in the practice of primary teachers.

In the book, on most of the topics there are author's researches such as: research of the mathematics teaching results at the end of the first grade; methodology of forming concepts for numbers up to 10 in the first grade (comparative study of the nine current textbooks in mathematics); formation of concepts for the numbers from 21 to 100 in the new nine textbooks in mathematics for second grade; methodology for studying addition and subtraction of numbers up to 20 with transition in the new nine textbooks in mathematics for first grade; methodology of addition and subtraction of numbers up to 100 in the new nine textbooks for second grade; methodological approaches in developing the section "Tabular multiplication and division" in the new textbooks in mathematics for second grade; analysis of the results of author's comparative research on the development of the topics "Finding an unknown summand" and "Finding an unknown multiplier" (in the nine textbooks for second

grade), “Finding an unknown diminutive” and “Finding an unknown divisible” (in the new seven textbook in mathematics for third grade); comparative analysis of the word problems in the new nine textbooks for first grade; analysis of a comparative study of the word problems in the new textbooks in mathematics for second grade; comparative analysis of the geometric curriculum in the textbooks for first grade; analysis of the results of a comparative study of geometric problems in the textbooks for second grade; comparative study of the geometric content in the new seven textbooks for third grade.

The book includes 57 tables, 19 diagrams, 18 figures and 269 photos.

The volume of the book is 525 pages of exposition and 11 pages of cited literature.

30. (2) Kirova, G. (2020). Work on projects in mathematics education in primary school. Sofia, Avangard Prima, 119 p. ISBN 978-619-239-495-0 COBBIS.BG-ID 43526152

Abstract: The first chapter of the book presents a theoretical analysis and traces the views of Bulgarian and foreign educators on the nature, place and importance of project education and in particular – working on projects with primary school students. The main goals of the work on projects in the teaching of mathematics and the types of projects are formulated, according to their duration. The steps (stages) in the work on a mathematics project are indicated.

The second chapter presents 11 projects for I, II, III and IV grade, which are author’s developments. They are experimentally tested in a real learning process. The projects range from thematic lessons (for first and second grade) on topics from timeless tales and novels for children, through the projects “Mathematical puzzles for second grade” and “Feast of the number 100” for second grade, “Mathematical dictionary” for third and for fourth grade, “The Room of Secrets” for third grade to the projects appropriate for fourth grade: “Sofia - Capital of Bulgaria”, “Mathematics from the world of football”, “Europe in numbers”, “Mathematics in the world around us” and “Europe is our home”.

The projects are described in detail and can be implemented with primary school students. The book contains many pictures.

The sample developments of the author’s projects can serve as a basis and can be transformed or enriched according to the views of the primary teachers or the students, who realize them with their pupils.

(The copyright of the PDF of the mathematics textbooks for I, II, III and IV grade belongs to IC KLET - Bulgaria OOD and the same cannot be copied and distributed)

31. (3) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2019). Mathematics for fourth grade, Sofia, KLET BULGARIA, ISBN 978-619-215-389-2

Fourth grade mathematics textbook for mainstream school

- 32. (4) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2018). Mathematics for third grade, Sofia, Anubis, ISBN 978-619-215-188-1**

Third grade mathematics textbook for mainstream school

- 33. (5) Vitanov, T., G. Kirova et al. (2017). Mathematics for second grade, Sofia, Anubis, ISBN 978-619-215-135-5**

Second grade mathematics textbook for mainstream school

- 34. (6) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2016). Mathematics for first grade, Sofia, Anubis, ISBN 978-619-215-056-3**

First grade mathematics textbook for mainstream school

INDICATOR E 21 Published university materials or materials, used in the school network

(PDF of the textbooks or materials for the primary grades in the school network are copyrighted by the publishers - IC KLET - Bulgaria OOD and IC Kolibri - and cannot be copied, provided or distributed)

- 35. (1) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2019). Colorful mathematics for fourth grade, Sofia, KLET BULGARIA, ISBN 978-619-215-408-0**

Textbook for fourth grade, designed for mainstream school mathematics elective classes

- 36. (2) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2019). Teacher's book for fourth grade mathematics, Sofia, KLET BULGARIA, ISBN 978-619-215-439-4**

Teacher's manual – a methodological guide for teaching mathematics in the fourth grade based on the textbook of PH KLET – Bulgaria Ltd (brand Anubis) for the mainstream school

- 37. (3) Kirova, G., Z. Sharkova, I. Pushkarova, D. Parusheva. (2019).
Collection of mathematics for fourth grade, Sofia, PH KLET
BULGARIA Ltd, ISBN 978-619-215-416-5**

Textbook – a collection of mathematics problems (with three levels of difficulty) for the mainstream school fourth grade.

- 38. (4) Vitanov, T., G. Kirova, I. Pushkarova, (2019). Tests in
mathematics for fourth grade (preparation for national external
assessment), Sofia, Colibri, ISBN 978-619-02-0544-9**

Textbook – a collection of tests for preparation for the national external assessment in mathematics at the end of the mainstream school fourth grade

- 39. (5) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva.
(2016). Teacher's book for third grade mathematics, Sofia, Anubis,
ISBN 978-619-215-491-2**

Teacher's manual – a methodological guide for teaching mathematics in the third grade using the Anubis textbook for the mainstream school

- 40. (6) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva.
(2017). Colorful mathematics for third grade, Sofia, Anubis, ISBN 978-
619-215-109-6**

A third grade textbook designed for mainstream school mathematics elective classes

- 41. (7) Kirova, G., Z. Sharkova, I. Pushkarova, D. Parusheva. (2018).
Collection of mathematics for third grade, Sofia, Anubis, ISBN 978-
619-215-308-3**

Textbook – a collection of mathematics problems (with three levels of difficulty) for mainstream school third grade

- 42. (8) Kirova, G., Z. Sharkova, I. Pushkarova, D. Parusheva. (2018). Collection of mathematics for second grade, Sofia, Anubis, ISBN 978-619-215-304-5**

Textbook – a collection of mathematics problems (with three levels of difficulty) for mainstream school second grade.

- 43. (9) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2016). Teacher's book for second grade mathematics, Sofia, Anubis, ISBN 978-619-215-491-2**

Teacher's manual – a methodological guide for teaching mathematics in the second grade using the Anubis textbook for the mainstream school

- 44. (10) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2017). Colorful mathematics for second grade, Sofia, Anubis, ISBN 978-619-215-109-6**

A second grade textbook designed for mainstream school mathematics elective classes

- 45. (11) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2016). Colorful mathematics for first grade, Sofia, Anubis, ISBN 978-619-215-020-4**

A first grade textbook designed for mainstream school mathematics elective classes

- 46. (12) Vitanov, T., G. Kirova, Z. Sharkova, I. Pushkarova, D. Parusheva. (2016). Teacher's book for first grade mathematics, Sofia, Anubis, ISBN 978-619-215-028-0**

Teacher's manual – a methodological guide for teaching mathematics in the first grade using the Anubis textbook for the mainstream school

- 47. (13) Zdravkova, S., G. Kirova. (2015). Colorful Vacation for fourth grade, Sofia, Anubis, ISBN 978-954-426-994-4**

An integrative teaching guide for summer vacation work after fourth grade

48. (14) Zdravkova, S., G. Kirova. (2015). Colorful vacation for third grade, Sofia, Anubis, ISBN 978-954-426-993-7

An integrative teaching guide for summer vacation work after third grade

10.01.2022 г.

доц. д-р Габриела Кирова: