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TASK STRUCTURE BY BLOOM TAXONOMY IN THE MATHEMATICS TEXTBOOKS OF LOWER ELEMENTARY CLASSES

Abstract: *Problem solving is the most common activity that students do in teaching mathematics. This paper presents a brief description of the concept of a mathematical task, its role in teaching, and stages that have to be approached to solving problems. The classification of tasks in teaching mathematics is made according to its cognitive complexity.*
The aim of the paper was to check if the tasks in randomly selected mathematics textbooks are directed to students' active mathematics learning and to which extension. Bloom's taxonomy served us in this situation with its six levels of cognitive processes. Learning goals (outcomes), typical active verbs, and most common mathematics textbook tasks are named for each level. The textbooks were also analyzed from the aspect of classification commonly used in elementary mathematics teaching, introduced by Josip Markovac.
From the insight of the results, one can easily conclude that they are not fully aligned with contemporary teaching and do not include all levels of cognitive processes. The textbooks mostly contain numerical tasks that relate to factual knowledge, covering the lowest levels of cognitive processes, while tasks that encourage students to use higher thought processes are left out.

Keywords: *Bloom's taxonomy, classification of tasks in mathematics, mathematics textbooks*

INTRODUCTION

We live in a time of rapid change, in which technology, communication, knowledge are constantly changing in order to improve and alter. "Mathematical language, mathematical theories and ways of presenting mathematical cognition are constantly evolving, changing and improving to meet the growing needs of modern scientific, technological and information society" (Mišurac, 2014, 9). A society that strives to modernization, progress and improvement must take care of the success of its members in mathematics, because it is mathematically way of thinking that is necessary in most areas of human activities.

“The student is not only the teaching carrier but also its goal. He creates and consumes it according to his (critical) needs and capabilities. The goal is to achieve student’s self-realization” (Stevanovic, 2002, 20). Cumulative mathematics learning involves a lengthy process of solving various tasks. In this way, students grasp the curriculum required by the program. In this sense, tasks whose solving builds students’ knowledge are the basis of mathematics.

Unlike traditional teaching in which the teacher had a dominant role, contemporary teaching has placed the student in the center of the teaching process. “Modern mathematics teaching is based on the psychological theory of constructivism, whose basic thesis is that learning is possible only with active student’s engagement” (Mišurac, 2014, 32). Contemporary teaching today is increasingly emphasizing the importance of active learning and students as active participants in the teaching process, and requires the application of a variety of methods and forms of work, contemporary learning and teaching strategies, the use of which will encourage students to systematic and active learning. The term active learning is a form of teaching that reflects the interdependence and complementarity of the process of learning and teaching itself. Nikcevic-Milkovic (2004, 47) states that “active learning involves knowing how to learn effectively, creating the need for learning as a lifelong education process and knowing how to think critically.”

Particular attention is given to the choice of tasks that are the means by which a system of basic mathematical knowledge, skills and habits is formed. Accordingly, better results are achieved and the teaching itself is of a better quality.

MATHEMATICAL TASK

“Thus what text and reading are for the initial teaching of the Croatian language, are the computational problems and their solving for the initial teaching of mathematics” (Markovac, 2001, 90). Mathematics learning involves a continuous process of solving different types of tasks. In this way, students get to understand the teaching content prescribed by the curriculum and build their knowledge in mathematics. Each task contains something unknown, something the student did not know, and what he learns by solving the task. “The task is essentially a request, an order, an incentive to find out unknown data, numbers, size from known data and conditions” (Markovac, 2001, 90). In this way, the mathematical task becomes the basis of new knowledge.

According to Kurnik (2000), a task is a complex mathematical object whose structure is not always so easy to analyze, and it consists of five items: *conditions, objective, theoretical basis, solving and review. Conditions* form an integral part of every task; known or given sizes, unknown or requested sizes and objects, and conditions that describe connections between known and unknown sizes and objects. *The objective* of a task is to find results, or to determine unknown sizes, properties, or relationships among them or to draw conclusions. Furthermore, in order to find a solution to a task, we need knowledge, that is*, theoretical facts*, which are related to the conditions and the purpose itself of the task, revealed through analysis. Relations between given and unknown quantities are restated by studying the conditions, breaking them down into parts, and applying theoretical facts. This controls how a task is solved. *Task solving* is carried out after the analysis and implies a path from the conditions to the results that accomplish the goal of the task. After a student has completed one task, he moves on to the next one, usually without checking the solution. Therefore, it can be concluded that finding a solution quickly is the most important in the process of solving a problem. However, *review* is the thing that should not be skipped. Important steps in the proper application of teaching mathematics tasks are to evaluate the results at the beginning and to check the results at the end of solving, thus achieving a greater educational and educational role. The focus on the task enables us to examine new ideas and to direct students' thinking more deeply, to nurture mathematical abilities and to increase their creativity to a higher level (Kurnik, 2000).

THE ROLE OF TASKS IN MATHEMATICAL EDUCATION

The aim of each teaching process is to bring forward the content of the course to the students and to enable them to acquire knowledge in their own way. Unlike traditional teaching, in which the dominant role was played by the teacher, in modern teaching this role belongs to the student. The most common student's activity is task solving. Also, the ultimate goal of mathematics education is to create mathematically literate individuals who will successfully apply their mathematical knowledge in their personal and professional lives. "Mathematical literacy is the ability of an individual to recognize and understand the role that mathematics plays in the world, to make well-founded decisions, and to apply mathematics in ways that meet the needs of that individual's life as a constructive, interested and thoughtful citizen" (Bras Roth et al., 2008 , 124). Modern mathematics teaching focuses on developing the skills of independent, creative study of mathematics by students and on creating the preconditions for the successful application of acquired mathematical knowledge and skills (Kurnik, 2008). Therefore tasks are an important tool in shaping the system of basic mathematical knowledge, skills and habits and contribute to the development of students' mathematical abilities and creative thinking. Appropriate choice and use of the tasks result in better results, and consequently the teaching of mathematics is better.

Educational standards, meaning, clearly defined levels of expected achievements at a particular educational level are set in the teaching process aiming to the desired level of mathematical literacy which the student shuld obtain. We can divide them into standards that relate to the content and concepts that students will learn (knowledge) and standards that relate to the processes of applying and using the learned knowledge (competence). Standards related to the learning content are called mathematical knowledge standards or content standards, and they determine what students need to learn (eg concepts, signs, formulas, etc.) and to what extent. They are universal and depend on various factors of the education system. Mathematical competency standards or process' standards are standards that relate to the processes of application of learned mathematical knowledge. Process' standards in mathematics determine the skills or competencies that a mathematically literate individual must possess in order to be able to use mathematical knowledge and levels of acquisition of these skills qualitatively (Misurac, 2014). These standards show us what competences a mathematically literate individual must develop, how much they are developed and how they will be developed. Content and process standards together define the mathematics curriculum as follows: content standards determine what each class will learn while mathematical competence standards determine how those content will be taught and studied in order to develop the skills of applying mathematics.

This requires, above all, a quality teacher, educator or professor who knows modern methodological insights and knows how to incorporate them into his own teaching practice. However, classroom teachers, as the first professionals to build mathematical knowledge, skills and attitudes about mathematics in students at the very beginning of their education, have the most complex task. They need to have a deep knowledge and understanding of mathematics in order to develop quality foundations for students to build upon later mathematical knowledge and skills. To succeed, teachers must have mathematical, pedagogical and psychological competences (Misurac, 2014). Numerous studies have shown that the teacher, by his / her competences, the way he / she works and the attitudes he / she has about the subject he / she teaches, influences the overall achievement of the students in the lower primary grades of teaching. Besides being an expert in the profession, it is necessary that the teacher motivates students to work. Motivation is equally important at the beginning and during the task. Each student should come up with a solution on his own and not give up as soon as he or she encounters a problem. On the other hand, the teacher should take care of each student, taking into account the range of different interests and skills of the students in the class. It should enable each of them to find something that interests them in the content they are learning. Also, students should be helped to find meaning in what they are doing and feel satisfied.

The choice of an interesting and appropriate task, adjusted to the students' abilities, contributes to their motivation, which follows the whole course of the student's activity in arriving to the solution of the mathematical task (Heize, 2005). Motivation can be increased through the use of creative tasks important to teachers, as they allow dynamic teaching aimed at meeting students' needs. However, such tasks are also important for students as they encourage them to learn with understanding and bring teaching problems closer to their personal experiences. Furthermore, if we relate a task to the everyday life, the content itself will be familiar and easily understood by the students. This replacement of a dull text in a life related task will awaken more interest in solving mathematical problems and mathematics in general. Also, creative tasks teach students how to identify a problem, find solutions, and solve a given problem in the best way possible. Tasks as elements of encouraging creativity in textbooks, while seeking new, unusual solutions to problems, require the possession of certain knowledge. Although the authors of many textbooks emphasize the importance of creativity and creative thinking in teaching and textbooks, the results of a 2009 mathematics textbooks study by Morana Koludrovic showed that implementation of tasks that stimulate students' creative abilities is almost negligible. "It seems that despite the generally accepted view of the necessity of fostering creativity as one of the key determinants of the human-creative curriculum, it often remains at the declarative level, depending on the individual affinities of the teacher, the author of the textbook, the student, and the particular school" (Koludrovic, 2010, 428).

Apart from the context itself, the content of the task, the ways in which it is solved and the systematic approach to the tasks are also extremely important. The American mathematician and methodologist Polya (1966) in his book "How I Will Solve a Mathematical Task" divides the process of solving a problem into four stages: *understanding the task, creating a plan, executing a plan, and reviewing*. Every student should not only understand the task, but also strive to solve it. If a student does not understand enough or doesn't show enough interest, he or she will not necessarily be guilty of it. The task should be well selected, neither too difficult nor too easy, but natural and interesting. Students need to understand the text of the task themselves and notice its main parts: the given information, the unknown and the condition. After understanding the task, plan creation follows it. It can be said that we have a plan when we know what actions we need to take to get what we want. When solving a task, the most important thing is to come up with an idea how to make a plan. In order that the teacher might understand the students' situation, he must remember his own experience, all the difficulties and successes he or she has had in solving the tasks. The best he or she can do for his or her students is to help them unobtrusively to come up to the idea. Previously aquired mathematical knowledge such as solved problems or proved theorems, is required to solve a mathematical problem. We believe that questions are crucial at this stage of the task; "*What is the theoretical basis of the task? How do I get from the known sizes to the unknown? How do I set a numeric expression?* "and the answers to the above questions are sufficient to make the plan. To execute the plan, we just need a little patience. There is a danger that the student will forget his plan. This usually occurs if he has accepted it on the basis of the teacher's authority (Polya, 1966). However, if the student made it himself, even with some help, he would not lose that idea so easily. However, the teacher should insist that students control every step. Students can be convinced of the correctness of the steps by answering the teacher's questions: "*Can you see that the step is correct? Can you prove that the step is right?* "This phase involves solving a task and finding a solution. After completing a task, students usually move on to the next. In doing so, they omit a very important and instructive phase of the work, and students find that the goal of mathematics teaching is to solve as quickly as possible a large number of tasks that are self-explanatory. "By looking at finished solution, by rethinking and reexamining the results and the path that led to them, they could strengthen their knowledge and increase their ability to solve tasks" (Polya, 1966, 12). Every good teacher should know that no task is ever drained enough, and should prove it in his work. It is also important for students to notice the connection between mathematical tasks and their connection with everyday life. “Connections are encouraged by well-selected tasks that require students to apply a variety of mathematical contents and processes. It is important that teachers take advantage of every possible situation to relate the content of mathematics to the content of other subjects and to different life contexts ”(Mišurac, 2014, 110).

CLASSIFICATION OF TASKS IN MATHEMATICS

Depending on the characteristics by which we divide them, there are many classifications of tasks. Classification implies “the systematic division and arrangement of some material” (Jojić et al., 2004, 105). We are going to present some of different classifications of mathematical tasks commonly used in the methodological literature.

Kurnik (2000) divides tasks by their complexity and difficulty and goal. According to their complexity and difficulty, we distinguish *standard and non-standard tasks*. *Standard tasks* are those tasks where there are no unknown components. Conditions are set out clearly and precisely, the goal is obvious, the theoretical basis is easy to spot, and the way to solve it is known and naturally unfolding. Although they do not contribute to the development of students' creative abilities, standard tasks provide a better understanding and faster acquisition of new mathematical content. *Non-standard tasks* are tasks that have at least one unknown component. If more than one component is unknown, non-standard tasks are also called *problem tasks*. Solving such tasks enables the development of logical thinking and independent research. Also, by solving non-standard tasks, the student will learn to appreciate the small modifications in solving the problem and lingering for an idea that leads to a successful completion. Many problematic tasks can be solved in many ways, from simpler to more complex ones. Now the questions naturally arise: “Why consider more ways of solving it? Is not one way sufficient because it leads to what is required and that is the solution to the task? ”(Kurnik, 2010, 4). One solution is sufficient if the goal is solely the task. But if we want to achieve more than that, then it is not enough. To solve a task in more than one way, more theoretical facts and methods are required than to solve a task in one way only. Then a greater amount of knowledge is activated and applied. In addition, knowledge is deepened with new knowledge and, most importantly, tasks with multiple ways of solving increasing students' activity and their interest in mathematics (Kurnik, 2008).

It is necessary to distinguish *complexity* as the objective property of the task and the *difficulty* of the task, which reflects the relationship between the task and whoever is solving it. For example, one and the same task for one student may be easy while for another student it is extremely difficult.

By its goal, Kurnik (2000) divides tasks into two groups: *determinative* and *evidential tasks*. The goal of a specific task is to find the unknown size or required size. In algebraic tasks, the unknown size is usually one number, and in geometric tasks the unknown is a geometric figure. On the other hand, the object of the *evidential* task is to show the truth of a claim made.

Polya (1966) listed some other features that distinguish these two sets of tasks. The main parts of the *determinative tasks* are: *the unknown, the given data* and *the condition*, while the main parts of the *evidential task* are: *the assumption* and *assertion* of the theorem to be proved or disproved. In order to solve a *determinative* task, we need to know its main parts well. The same is true for *evidential* tasks. Markovac (2001) divided computational tasks in low primary school mathematics into four characteristic groups: *numerical* or computative *tasks*, *text* or *word tasks, size tasks* and *geometric tasks.*

Numerical tasks are those tasks in which numbers are connected by signs of computational operations and relations. For example, tasks are 2 + 3 =, 4 · 6 =, 5 <7, 36 + 64 =, 987 · 3, 784: 8, etc. Students first encounter this type of task. The purpose of *numerical tasks* is "to build an appropriate computational technique because they allow attention to be focused solely on the flow of performing computational operations" (Markovac, 2001, 90). They are also used very successfully in the automation of computational operations, and are used by teachers when explaining computational procedures. The simplest and the easiest *numerical tasks* for students are the tasks of comparing numbers (eg 2 <4, 15> 9, 8 = 8) which, in addition to numbers, contain a sign indicating the relationship between numbers. Following them are the tasks in which, operating with two numbers, one finds a third number that is in relation to them (eg 1 + 4 = 5, 16 - 6 = 10, 36: 6 = 6). They are introduced gradually, first in a set of numbers up to 20, then up to 100, up to 1000 and then over a thousand. A special group of numerical tasks consists of tasks with *multiple computational operations*. We differentiate *first-degree* computational operations (addition and subtraction) and *second-degree* computational operations (multiplication and division), which we give priority in solving tasks involving different-degree operations. Students find tasks that contain operations of different degrees difficult (eg 4 + 5 · 8 - 14), and especially tasks that contain all four computational operations (15 + 6: 3 + 2 - 9 · 2). Solving such tasks requires proper foreknowledge and high concentration of attention. An additional element of difficulty is introduced by the use of round brackets, and particular attention should be paid to those tasks in which, by using the same numbers and the same computational operations, the order of performing computational operations (e.g., 20 + (4 · 2) and (20 + 4) changes) · 2). Proper application of numerical tasks in initial mathematics teaching requires understanding the content of the task. Comprehension of this depends on the knowledge of the meaning of the operation to be performed, the knowledge of the meaning of the signs in the task (signs for operations, relations, parentheses), the foreknowledge that the student has and the concentration of the student's attention (Markovac, 2001). Textual tasks are those tasks in which data and relationships between them are formulated in words that must first be formatted computationally, and then by an appropriate computational operation, find out unknown data that is expressed by a number. "A*pplication of textual task bring to realisation of several educational purposes" (Markovac,* *2001, 9*2). First of all, by solving such tasks students are trained to apply mathematical knowledge in their daily lives. Also, the student regards it as an instrument by which something is solved in particular environments. Text tasks also serve to develop computational technique by connecting it directly to the student's real life situation. Solving this type of tasks brings to the acquiantance of the essence and the meaning of certain computational operations. However, in order to accomplish the educational purpose of textual tasks, they must satisfy certain methodological requirements. First of all, they have to be realistic! This, of course, does not mean that all information about an appearance (eg the population of a city) must be absolutely accurate. The reality questioned here is reflected in the approximate accuracy and credibility of the information contained in the task. In addition, the tasks must be clear and understandable to the students. The linguistic formulation of the task itself must also be clear, appropriate to the student's capabilities and interests. Data in the text tasks should be taken from the immediate environment as this will gain and sustain students' interest. These types of tasks have to be graded by weight, so they are divided into *simple* and *complex* tasks. *Simple* are those tasks that require one computation operation, and *complex* ones are those with two or more operations of the same or different degree. First, simple and then complex tasks are introduced. Besides the above mentioned *text tasks*, those tasks that require numerical operations are also useful. Those are, for example, tasks: *Enlarge number 6 with number 8; The minuend is 25, thesubtrahend is 11. What's the difference ?; The sum of numbers 138 and 256 reduce to their difference. Divide the product of numbers 46 and 53 by their difference. etc.* Such tasks have two functions. In addition to enabling students to operate numbers and to master mathematical terms, these tasks strongly influence students' thinking and concentration. *Size tasks* are tasks in which, in addition to numbers, signs for operations and relations, labels for specific sizes appear: length, area, volume, mass and time (Markovac, 2001). They can appear in the form of a text *(eg distance from Zagreb to Split is 409 km and the distance from Zagreb to Osijek is 290 km. What is the distance from Split to Osijek via Zagreb?)* or in the form of a numerical task (*eg 409 km + 290 km =*). Their implementation is methodologically shaped in the same way as textual tasks except for unit size calculations. Then, larger unit sizes are first converted to smaller (*eg 5 m + 3 dm + 2 cm =* ___ cm) or smaller to larger, depending on the task and then calculated. *Size tasks* require more thought-making effort, so it is more difficult for students to solve such tasks than numerical or textual tasks. The *difficulty* or ease of solving tasks depends on the knowledge or ignorance of the unit length calculation. Therefore, teachers should devote sufficient time to learning this important teaching content that their students will encounter on a daily basis. *Geometric tasks* are tasks of geometric content, and they include drawing geometric figures, transferring, summing, subtracting lengths, measuring lengths and areas, calculating the extent and area of some characters, etc. (Markovac, 2001). In this way, students acquire elementary geometric knowledge and become trained in real life situations. Geometric tasks are divided into two groups: *tasks that enable students to use geometric accessories (*ruler, triangle, joiner) and *tasks that help them* *acquire elementary geometric knowledge.* Thus, the tasks of the first group teach the students how to use the pen, ruler, triangle and joiner correctly, while when solving the tasks of the second group, the students adopt certain geometric facts such as the extent and surface of the rectangle, length compliance, etc. Some tasks encourage the revealing and learning the geometric features in the close ambience.

EDUCATIONAL OBJECTIVES AND LEARNING OUTCOMES

The teaching planning process begins with goals setting. *Educational goals* clearly and concretely determine what should be achieved with teaching (knowledge, skills, attitudes), or describe what the student has to learn. After successfully completing the course syllabus, the student will be able to perform certain activities at a socially acceptable level. Therefore, choosing educational goals is the most important decision in curriculum design and curriculum development (Kovacevic et al., 2010).

The curriculum approach has systematized the process of planning, organizing and realizing teaching in a modern and contemporary way, based on learning outcomes. Learning outcomes are statements that express what a student needs to know, understand, and be able to do upon completion of the learning process (Dubrovic, 2008). "These are statements about what the student is expected to know, understand, can make or evaluate as a result of the learning process" (Divjak, 2008, 4). It is about a visible change in the development of a person as a result of learning. The outcomes facilitate the learning process and help teachers to determine exactly what students should be able to accomplish at the end of a given learning period, and help students to understand what is expected of them, but also help future students and employers who receive information about skills and competences acquired during schooling (Dolaček- Alduk, Loncar-Vickovic, 2009). Defined learning outcomes focus teachers' expectations on the essentials of what they teach. The classification of competences in the European Qualifications Framework on knowledge, skills and competences in the narrow sense (autonomy and responsibility) was made with the aim of easier description and determination of levels (Lončar-Vicković, Dolaček-Alduk, 2009). Knowledge as an outcome signifies the acquisition of information through learning. It is the basis of facts, principles, theories and practices related to the field of learning itself. Knowledge is a set of adopted and related information, which can be theoretical and factual. Skills are application of knowledge and the use of prescribed modes to solve a problem. They can be cognitive (logical, intuitive and creative thinking), psychomotor (dexterity, use of methods, materials, etc.) and social. Competences denote the ability to use knowledge, skills and methodological abilities (personal, social, etc.) in learning or work and in personal and professional development. One type of competencies are educational competences, which include autonomy and responsibility.

However, learning outcomes or *student's achievements* are not statements that explicitly enumerate and describe educational content or say what students and teachers should do in teaching. Student's achievements are focused on students and their activities. For this reason, they are always expressed in active verbs (identify, describe, analyze, compare, sort, apply, etc.) that express students' activity. Student's achievements are important to teachers, students and parents. They provide teachers with a clear and precise basis for determining the content they will teach, the teaching methods and strategies they will apply, determining the activities students need to know, defining the test tasks for evaluating student's achievements and progress, and evaluating the implementation of the curriculum they apply. They provide students with a clear and concrete picture of what they will need to know and be able to do at the end of each topic, unit, class, educational cycle or schooling, a clear framework that guides their learning, a clearly articulated basis for preparing for exams, or checking their achievement. Lastly, they are important to parents because they allow them to gain a clear picture what kind and depth of knowledge, skills and values children will be able to acquire in school, and allow successful assisting and monitoring of their child's progress, etc.

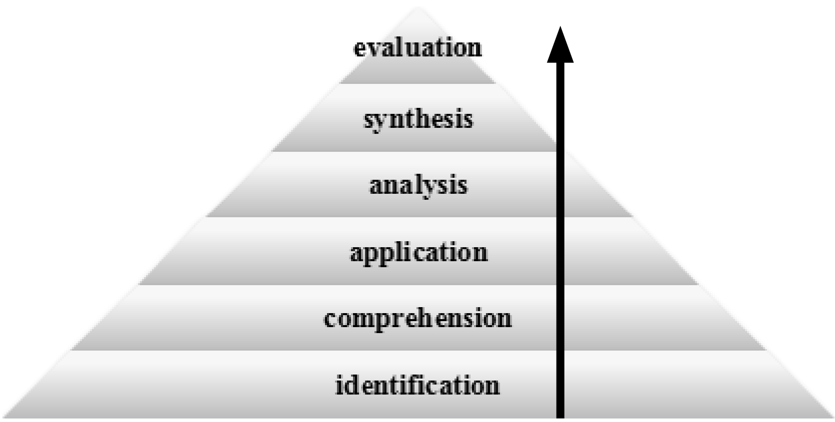
BLOOM'S TAXONOMY OF EDUCATIONAL OBJECTIVES

Different *taxonomies of educational objectives* have been compiled to classify goals in education. The term taxonomy comes from the Greek words *tassein* (nominate) and *nomos* (law, science), and denotes a scientific discipline that categorizes and classifies something based on the similarities and differences of the taxonomic unit (Simpson, 1972). One of the most famous classifications of educational goals is called *Bloom's taxonomy* of educational goals. It was named after the American psychologist *Benjamin Samuel Bloom*, who, along with his collaborators, presented it in 1956. The primary goal of Boom's taxonomy is to create a consistent system that starts from logical-content, pedagogical and psychological principles, and principles of learning and teaching. Also, the purpose of this taxonomy is to facilitate communication in the field of operationalization of goals and tasks of educational processes, with particular emphasis on teaching (Diković, Piršl, 2014).

Bloom's taxonomy is based on analyzes of intellectual behaviors through which students gain knowledge during schooling. The ultimate goal of the learning process is to acquire lasting and usable knowledge and skills as products of thought. Thinking takes place in a person's brain and stores knowledge and skills that are not measurable. Only by observing a person's behavior can we conclude how refined they are. Learning is viewed by Bloom and co-workers as an art of behavior. The aim of their collaboration was to systematize the behavioral categories used during learning to help teachers plan and evaluate school learning (Nimac, 2018). The educational goals and behaviors used by the student during learning are divided into three categories, ie areas that are interrelated: *cognitive area* (knowledge and understanding), *affective area* (attitudes), and *psychomotor area* (skills). Anderson and Krathwohl reassessed Bloom's taxonomy in 1990. (Nimac, 2018). They linked it to the contemporary theories of learning and teaching. The original taxonomy was focused on the *cognitive* area only, and the other two areas were later defined: *affective* and *psychomotor*. Today, it is well known that all areas of knowledge are equally valuable and that within each area, educational goals are put into categories. These categories represent levels of knowledge that are sorted by difficulty or complexity, from the simplest to the most complex. Accordingly, a student can only move to a higher level after mastering the previous one.

The knowledge dimension in the revised taxonomy contains four structures of the knowledge dimension instead of the three categories previously used, namely factual, conceptual, procedural, and added meta-cognitive knowledge. *Meta-cognitive* knowledge as a new, fourth dimension provides insights that were unknown at the time of the original taxonomy. It includes knowledge and awareness of an individual cognition and knowledge of cognition in general. Knowledge about this category is increased through researches on the importance of student awareness in his own cognitive activity and the use of that same knowledge, adapted to the ways we think and act (Marinović, 2014).

Bloom paid the most attention to the cognitive, intellectual or mental field. Most teachers also place students' intellectual development first, which is why this area is best known. Students' achievements in this area are arranged hierarchically, from the lowest to the highest cognitive level. Thus, Bloom's taxonomy of educational goals from 1956 contains six levels of learning (Picture 1), ranging from recognition to evaluation.



Picture 1. Bloom' taxonomy of educational aims from 1956. g.
(source: Kovačević et ass., 2010)

Identification is the lowest level of application of cognitive abilities. It involves "*remembering what has been previously learned*" (Dolaček-Alduk and Lončar-Vicković, 2009, 36). The student must gain basic knowledge in order to understand the meaning of the subject he is learning. All that a student needs to achieve at this level is to recall certain information even if he or she does not understand its meaning. On this level, the student will be able to identify, name, describe, mark, enumerate some facts, etc. *Comprehension* involves thinking about the meaning of the facts that the student has adopted. Therefore, this level of knowledge is higher than the previous one and represents the lowest level of understanding. The category of comprehension can be achieved by interpreting the learned facts, by summarizing, explaining, or anticipating the consequences. For example, a student should be able to interpret figures and tables at this level of knowledge, translate verbal tasks into formulas, give an example, predict facts, interpret, paraphrase, etc. *Application* refers to the use of learned rules, laws, methods and theories in new situations. Accordingly, a student should be able to solve a mathematical problem at this level or demonstrate the correct use of a procedure. *Analysis* is the thought process of dividing a whole into its parts (Kovacevic et al., 2010). We expect students to break down the learned content into its constituent parts at this level, describe those parts and identify the links between them, and to understand the principles by which organizational structures are built. This level requires an understanding of the content and organizational structure of the material, and we consider it higher than the level of comprehension and application. For example, at this level, the student must compare, contrast, differentiate between facts and conclusions and causes and consequences, determine the relevance of the data, analyze the organizational structure, etc. A procedure that is opposite to analysis is called *synthesis*. Synthesis assembles a larger whole from several smaller parts. This level emphasizes creative behavior with an emphasis on creating new structures. The student can create a new whole by combining, hypothesizing, planning, reorganizing or proposing alternative solutions. *Evaluation* is operated when one wants to evaluate the value of someone or something. This process itself consists of thought processes of assessment and evaluation that ask questions such as: “Is something true or false? Is it good or bad? Is it acceptable or unacceptable? Is it allowed or not allowed? Is it useful or useless? “. At this cognitive level, the goal, based on well-defined criteria, is to judge some content (Kovacevic et al., 2010). Because it contains elements of all previous levels, with the ability to evaluate values based on well-defined criteria, evaluation is the highest level in the cognitive hierarchy. At this cognitive level, the student evaluates, assesses the appropriateness of the conclusion from the presented data, evaluates the value of the task, interprets and compares the information obtained.

Teaching mathematics will achieve its goals and develop mathematical competences in students, encouraging the development of all the above levels of knowledge. As the mathematic task is the basic and most common way of learning math, it is clear that classes that combine different levels of knowledge should be combined in teaching. Some mathematical tasks serve to automate calculating and identify mathematical objects, some seek understanding of concepts, and some apply mathematical insights to problem situations. Similarly, when solving complex tasks, we sometimes need to analyze or synthesize procedures or evaluate certain claims, evidences, or solutions. All this suggests that just like knowledge levels, we can classify mathematical tasks into levels according to Bloom’s taxonomy. These task levels also encourage the development of different cognitive areas of the student’s knowledge. In order to try to classify the tasks according to Bloom’s taxonomy, we have drawn a parallel with the learning outcomes of each level and tried to present typical mathematical tasks that could provide the appropriate outcomes. In this sense, this division of tasks is innovative and subjective, but also an important indicator of the range of tasks that would stimulate all levels of knowledge.

Table 1 shows Bloom's taxonomy of learning goals (outcomes) and typical active verbs (*Table 1*) that describe the activity to be practiced and measured at each level of the cognitive area. Studying the formulations of mathematical tasks and their complexity, based on our subjective assessment, we have added to the last column of the table above the examples of mathematical tasks that most commonly appear in mathematics textbooks for teaching mathematics in lower primary classess, which should describe a particular category. We were guided by the recommended active verbs and goals with respect to levels. The first-level tasks are based on identifying information, ideas, and form concepts which students have previously learned. The second-level tasks require from students to understand and interpret information based on the previously acquired knowledge. The third level requires solving problems in a specific new situation by applying the concepts, theories and principles learned. Penultimate two levels, analysis and synthesis, are based on the understanding of the structure of the material itself, both in terms of its parsing and its unification, ie synthesis into a new whole. The last level, evaluation, refers to the judgment of particular mathematical procedures, concepts or statements.

Table 1. Cognitive domain of Bloom taxonomy – Bloom, 1956.

GOALS (OUTCOMES) OF LEARNING	**ACTIVE VERBS** **„Student will be able to…"**	**TYPICAL TASKS IN MATHEMATICS**
I. level **IDENTIFICATION**	define, describe, identify, identify, mark, enumerate, relate, name, repeat, reproduce, utter, select, cite, express, sort, remember, memorise	recognizing geometric figures (triangle, circle), enumerating multiples of 100, naming hundreds
II. level **APPREHENSION / LEARNING**	describe, explain, discuss, set an example, group, align, classify, convert, defend, differentiate, extract, evaluate, perform, conclude, predict, summarize, translate, rephrase, situate, show	giving an example of a plane in the classroom, converting length units of measurement (from smaller to larger and vice versa), differentiating mass units
III. level **APPLICATION**	apply, calculate, select, adjust, solve, discover, demonstrate, show, handle, prepare, exploit, profit, use, produce, relate, illustrate, sketch	calculating twice bigger length, using a geometric accessory (carpenter, ruler), illustrating a two-point line, estimating the mass of objects and the volume of fluid
IV. level **ANALYSIS**	analyze, parse, sketch, differentiate, isolate, display, point to, compare, relate to, classify, sort, confront, contrast, calculate, examine, investigate, experiment, verify	analyzing longitude to line affiliation, comparing diameter and radius size, distinguishing diameter and radius of a circle

V. level **SYNTHESIS / CREATION**	edit, connect, integrate, assemble, create, procreate, develop, combine, collect, gather, design, generate, modify, organize, plan, rearrange, align, write, propose, design, construct, revise, reconstruct, formulate	creating a geometric figure by combining angles, writing a task in words using an image, and computing it in two ways, constructing a circle with a given diameter, constructing two circles with the same center, formulating rules for dividing by 10 and by 100
VI. level **EVALUATION / ASSESMENT**	identify, estimate, predict, evaluate, mark, judge, compare, conclude, interpret, contrast, criticize, justify, select, support, recommend, argue, confirm	determining the characteristics of geometric bodies and geometric figures, comparing the right, pointed and obtuse angles, indicating their similarities and differences, comparing the longer and shorter ways of multiplying multiples of number 10 by a one-digit number, choosing a better one and explaining its choice

METHODOLOGY

We used the content analysis method in the study. The tasks in two randomly selected mathematics textbooks will be analyzed in the extension of this paper work. The analysis will be done according to the most widely accepted classification of educational goals, i.e. Bloom's taxonomy. As mentioned above, the cognitive domain contains six levels: *recognition, understanding, application, analysis, synthesis and evaluation*. When creating textbooks, one should strive for a variety of tasks that involves tasks of all levels, from the lowest to the highest. This would encourage students to use both lower and higher thought processes and, as a consequence, develop skills and competencies, as well as critical and creative thinking. The goal is to investigate how much textbook tasks really fit with Bloom's taxonomy, or levels of cognitive processes. We will also analyze tasks by Markovac classification, which is, as we have already said, divided into four characteristic groups: *numeric or number tasks, text or word tasks, size tasks and geometric tasks*.

Previous researches on issues and tasks in the science textbooks have shown that levels of educational attainment are not uniformly represented, but that competences that enable knowledge acquisition prevail over those that enable the acquirement of abilities, skills and attitudes (Borić et al., 2013). "The obtained results lead to the conclusion that both science textbooks and workbooks are not aligned with the requirements of the National Curriculum Framework, Curriculum and Textbook Standard because the issues in them do not encourage the development of competencies, but rather focuses students on factual knowledge and its reproduction "(Boric et al., 2015, 293). The starting point is that the same will be confirmed in these mathematics textbooks.

Two randomly selected textbooks were chosen, among the textbooks approved by the Ministry of Science, Education and Sports and used as such in many Croatian schools. They are intended for students of the third grade of elementary school.

RESULTS AND DISCUSSION

The first analyzed textbook contained 298 tasks. 114 of them were of the *lowest* level (indicate percentage). These tasks were mostly ...,out of which 51% were *numerical* tasks. Among others, *text tasks* (45) and *size tasks* (11) were represented. There were 135 tasks arranged in all four types of tasks on *the second* level of cognitive processes according to Bloom's taxonomy. With a share of 67%, *text assignments* are prevalent in this textbook. They are followed by *numerical* ones (26), *geometric* (12) and *size tasks* (7). The textbook has 27 *third level* tasks, ie 17 *geometric tasks*, 9 *size tasks* and only one *text task*. *The fourth level* consists of *numerical* (2), *textual* (6) and *geometric* (14) tasks, which is a total of 22 textbook tasks. The last two levels are not represented at all in this third grade mathematic textbook. Half of all of the tasks in the textbooks are the those that require *comprehension* (Table 2)

Table 2. Analysis results „Textbook 1“

study levels / Classification to Markovac	identification	apprehension	application	analysis	synthesis	evaluation	**total**
numerical tasks	**58**	26	/	2	/	/	**86**
text tasks	45	**90**	1	6	/	/	**142**
size tasks	11	7	9	/	/	/	**27**
geometric tasks	/	12	17	14	/	/	**43**
total	**114**	**135**	**27**	**22**	**/**	**/**	**298**

„Texbook“ 2 had 190 tasks, 27 of which were related to the *identification* level. 13 of them are *numerical* tasks, 7 are *size tasks*, 5 *text* and 2 *geometric tasks*. *The second* level contains 113 tasks, and more than half of them are *numerical tasks*. There are less *text tasks* (41), especially *geometric* tasks (6) and *size* tasks (2). Exactly 35% of the *text tasks* are related to application. The rest represented tasks are 10 *geometric*, 9 *size* and 7 *numerical* tasks. There are only two types of tasks in the textbook that require *analysis*, and those are *textual* (7) and *geometric* (3) tasks. Unfortunately, tasks related to *synthesis* and *evaluation* were omitted (Table 3).

Table 3. Analysis results „Textbook 2“

study levels / Classification to Markovac	identification	apprehension	application	analysis	synthesis	evaluation	**total**
numerical tasks	13	**64**	7	/	/	/	**84**
text tasks	5	41	**14**	7	/	/	**67**
size tasks	7	2	9	/	/	/	**18**
geometrical tasks	2	6	10	3	/	/	**21**
total	**27**	**113**	**40**	**10**	**/**	**/**	**190**

As we have seen from tables 1 and 2, *the first four levels* of Bloom's taxonomy are included in the analyzed textbooks, while the last two levels that allow the development of the highest cognitive processes are absent. The most common tasks in these textbooks are those of the second level in which students need to approach a particular task with understanding, remembering basic mathematical concepts (eg sum, factors, multiplication, quotient, direction, etc.) and then relate it to the previously learned teaching content. There is a slightly lower representation of the *first* level in the „textbook 1“, ie tasks related to the recognition, memorization and reproduction of the learned (eg summing up to 20). On the other hand, *application* tasks that largely cover geometry are on the second place in the „textbook 2“. Such tasks require the use of geometric accessories (eg ruler, triangle, conifer) to illustrate a direction or a circle. Tasks are predominantly related to factual knowledge, covering the lowest levels of cognitive processes. Most of these tasks involve automated computation (eg addition, subtraction, multiplication, division). The tasks in all the teaching units are conceptualized in the same way, which leads to the creation of monotony and student's loss of interest in the tasks. Also, tasks lack precise, active verbs, so it is not so easy to determine exactly what level they are at. If the verbs were highlighted, the students would have been able to understand what was being asked in the task. At least the tasks in these textbooks relate to analysis and never explain *what* and *how* students should analyze.

Often, such tasks contain sub-questions that have nothing to do with analysis but only relate to remembering learned information (Mlakar, 2016). There isn't a single task in any textbook that encourages the use of the highest levels of cognitive processes according to Bloom's taxonomy, just as we assumed before the analysis itself. The omission of the tasks of *synthesis* and *evaluation* is precisely that what we consider the greatest shortcoming of these textbooks. Though, synthesis should encourage students to express their views on an idea, determine whether something is good or bad, give judgment and make a critical argument, and the sixth, highest level implies that students create new ways of solving problems and create new tasks similar to those in textbooks. Due to the above mentioned, each textbook should have a variety of tasks that will further motivate students and ultimately enable them to progress in mathematics.

We have also noticed that there are very few geometric tasks that require students to draw geometric figures, to transfer and measure lengths, to calculate the circumference and area of some characters, etc. This is a glitch that is repeated by textbook authors in all the teaching subjects. Geometric tasks are known for expanding awareness of the space that surrounds us, and for developing reasoning skills and dawn skills. Another additional reason for the application of such tasks is that geometry has a threefold role: *to stimulate*, *challenge* and *inform*. In short, it is an interesting and instructive field of mathematics that empowers students to apply it in real, life-changing situations.

Since not only one textbook tasks have been analyzed, it can be said that the results obtained are good indicators of the situation that should not be found in textbooks. Because of this, teachers need to invest extra effort and time to create tasks that will encourage students to use higher thought processes. Therefore, a textbook with a variety of tasks for teachers would help and greatly facilitate already demanding work.

CONCLUSION

This work aimed to investigate how much the tasks in the randomly analyzed textbooks inspired students to active learning of mathematics. Bloom's taxonomy with its six levels of cognitive processes has served us in the process. Analyzing the tasks according to cognitive levels, we wanted to see how much each level was represented. When creating textbooks, one should strive for a variety of tasks that involves the presence of all levels, from the lowest to the highest. This would not make learning passive, as it would encourage students to use thought processes.

The analysis of the tasks of the two textbooks reveals that they are not fully in line with contemporary teaching and do not include all levels of cognitive processes; they does not encourage the development of competencies; but they direct the students to factual knowledge and its reproduction. We should take into consideration that two textbooks have been analyzed, but they still show a situation that should not be found.

The tasks covered only *the first four levels* of Bloom's taxonomy, while the last two levels were omitted. Thus, we conclude that the textbooks mostly contain factual knowledge tasks, covering the lowest levels of cognitive processes, as we assumed at the beginning of this paper work. Highely represented tasks are those of *the second level* in which students need to understand a particular task in order to be able to relate it to previously learned teaching content. The tasks of *recognizing, memorizing* and *reproducing* what has been learned are on the second place in the „textbook 1", and the tasks *of application* that are most commonly found in the field of geometry in the „textbook 2". The least represented tasks in these textbooks are those that require analysis. Unfortunately, these tasks lack instructions that indicate to students *what* and *how to* analyze. As noted above, there are no *synthesis* and *evaluation* tasks which I consider to be the biggest deficiency of these textbooks. Synthesis encourages students to express their views on an idea, to give judgment, and to argue critically. Sixth, the highest level is equally important, it requires students to create new tasks and create new ways of solving tasks. Also, let's look back at Markovac division. Namely, both textbooks lack in tasks with sizes and geometric ones. These tasks are well suited to the development of analysis and dawn and are certainly not sufficiently represented.

This paper work should encourage textbook authors to focus more on including the highest-level tasks (synthesis, evaluation) of cognitive processes. Otherwise, students will not be encouraged to use the necessary thought processes, which will prevent them from progressing in mathematics. It will also give teachers even more work because they will have to design the tasks themselves, and we know that this is a process that is time consuming and not at all simple.

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