Romanian Review of Geographical Education
ISSN 2285-939X
ISSN-L 2285-939X

ANALYSIS OF RELIEF ON THE MAP IN PRIMARY EDUCATION

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DOI: http://doi.org/10.23741/RRGE20252

ABSTRACT

The aim of the study is to investigate the effects of using a worksheet to analyze the relief of a small territory, represented on a thematic map. The study involved 16 fourth-grade students. The activity consisted of three stages: in the first stage, a pre-test was applied; in the second stage, students individually analyzed the relief on a hypsometric map and solved the tasks in a worksheet based on this map; in the third stage, a post-test was applied. The results show that students, after the formative intervention, have a greater volume of knowledge about the relief of the commune in which they live. Analyzing the relief represented on the hypsometric map and solving the tasks in the worksheet by students determined positive effects on the volume of knowledge about the relief.

Keywords: *hypsometric map, worksheet, mountain relief, analytical thinking, simultaneous learning, individual activity.*

Cite this article as:
Bogdan, N.-I. (2025). Analysis of relief on the map in primary education. *Romanian Review of Geographical Education*, *14*(1), 17-28. http://doi.org/10.23741/RRGE120252

INTRODUCTION

Insert Children acquire their first knowledge about landforms in preschool education during learning activities organized within the "science" domain (Dulamă, 2012) in response to the question, "What is it like here on Earth?" (Ministry of National Education, 2019, p. 25). The "Curriculum for Early Education" recommends that children engage in simple environmental investigation activities using specific tools and methods under the guidance of the teacher. In these activities, they identify and describe characteristics of planet Earth (Ministry of National Education, 2019, p. 24).

In primary education, students study some "Intuitive Elements Regarding Earth" in the subject "Mathematics and Environmental Exploration" in preparatory class and first grade. In second grade, they deepen their understanding of the topic "Landforms: mountains, hills, plains" (Ministry of National Education, 2013, p. 25). In third grade, within the subject "Natural Sciences," students expand their knowledge about the "Natural Resources" of the subsoil, correlated with various landforms, and begin to understand the role of landforms in the "Water Cycle in Nature" (Ministry of National Education, 2014a, p. 10).

In fourth grade, in the subject "Natural Sciences," students can establish the relationship between landform evolution and "Evidence of Past Life: Fossils," as well as certain aspects related to landform protection, under the theme "Environmental Protection" (Ministry of National Education, 2014a, p. 10). In a systematic manner, students have the opportunity to study landforms in fourth grade in the subject "Geography," under two themes in the field of "Elements of Local and Nearby Geography": "General Observable Characteristics of the Local Horizon: Landforms, Hydrography, Vegetation"; "From the Local Horizon to the Country: The Native Locality" (Ministry of National Education, 2014b, p. 8). The study of

ISSN 2285-939X
ISSN-L 2285-939X

landforms extends to the national scale within the field of "Elements of Romania's Geography," under the topic "Landforms: General Characteristics and Relief Levels" (Ministry of National Education, 2014b, p. 8).

Didactic works on geography teaching in Romania provide numerous theoretical and methodological guidelines (Mândruț et al., 2012; Tălângă, 2007) aimed at studying landforms in primary education, as well as examples of learning activities (Dulamă, 2011). Many studies suggest utilizing the local environment to organize direct observation activities of environmental components, including landforms (Dulamă, 2010b; Mihus, 2015), thereby creating optimal conditions for developing geography-specific competencies (Dulamă, 2010c, d, e), as outlined in the curriculum (Dulamă & Magdaș, 2014).

In primary education, students acquire a range of landform-related concepts (mountain, hill, plateau, plain, altitude, etc.) through a conceptualization process focused on analysis, comparison, abstraction, and generalization (Dulamă, 2010a) and become familiar with thematic maps (Dulamă, 2005). The knowledge base built in primary education is further expanded and deepened in fifth grade with a broader set of landform-related concepts (e.g., valley, slope, interfluve) (Dulamă, 2007, 2010f).

In organizing effective learning activities related to landforms, an important factor is the competence or expertise of primary school teachers, as well as their opinions and beliefs about teaching and learning. The initial training of teachers, including theoretical, methodological, and practical preparation for teaching geography in primary education (Dulamă, 2011), takes place at universities under the specialization "Pedagogy of Primary and Preschool Education" (Petrovici & Masari, 2014). In the 6th semester, the subject "Geography and the Methodology of Teaching Geography" is allocated 2 ECTS credits (24 hours: 12 hours of lectures; 12 hours of seminars). Studies show that students experience higher satisfaction levels during their observational and experiential teaching practice (Kelemen, 2015) in primary school classes.

Several studies analyze the initial training of Romanian students for teaching the subject "Mathematics and Environmental Exploration" (Magdaș et al., 2018), investigate teachers' opinions about the official primary school curriculum (Popa & Bucur, 2015), and examine official documents for "Mathematics and Environmental Exploration" (Magdaș et al., 2017b). Additionally, they provide a detailed analysis of the competencies and contents of the school curriculum (Dulamă & Magdaș, 2014).

Textbooks play a significant role in studying landforms as essential learning tools for students. Researchers have investigated teachers' opinions about a digital textbook for "Mathematics and Environmental Exploration" (Magdaș et al., 2017a), the multimedia learning activities included in it (Buzilă et al., 2017; Ilovan et al., 2018), and the ways textbooks can be used for discovery-based learning about the environment (Buda et al., 2020). Two studies focused on fourth-grade geography textbooks analyzed their texts (Chircev et al., 2015) and illustrations (Chircev & Chircev, 2014).

Several studies conducted in Romania, involving primary school students, have addressed various topics and aimed at specific objectives: studying the landforms of Hășdate (Crișan, 2020), observing the mountain landscape (Șomîtcă, 2017), exploring fluvial landforms shaped by a stream (Dulamă & Buda, 2014), developing geographical representations through organized hiking activities in mountain areas (Drînda, 2020), analyzing rivers on maps of a commune (Bogdan, 2024), observing a rural settlement (Ilie et al., 2020), discovering energy sources (Buda et al., 2020), forming representations of forests and other environmental components (Pahome, 2023a, b), understanding the local environment (Vidrean, 2020), and learning about natural phenomena through animated films (Vereș et al., 2020).

The importance of outdoor activities in shaping students' geographical representations is emphasized in research (Deac et al., 2019), along with the role of film screenings (Ilie & Magdaş, 2021) and animated films (Vereș & Magdaș, 2020; Vereș, 2024). The use of smart boards to create optimal contexts for multimedia learning is also highlighted (Magdaș et al., 2019b; Zoltan et al., 2019). Literature underlines the significance of digital products in teaching (Magdaș et al., 2019a), electronic devices (Rus et al., 2019), and specific teaching methods and techniques (Pahome, 2022a, b; Pahome, 2023a).

A review of the literature on geography didactics and studies conducted in Romania on landform education and other environmental components shows that primary school teachers have shown interest in conducting research aimed at students' understanding of landforms. Building upon previous research and the premise that students need teachers' support to learn how to analyze and systematically study

ISSN 2285-939X
ISSN-L 2285-939X

landforms, we initiated a study to investigate the effects of using a worksheet to analyze landforms in a small-scale territory represented on a thematic map.

In our study, the independent variable was the observation and analysis of landforms on a commune map, indirectly guided by the teacher through a worksheet. The dependent variable was the amount of knowledge about landforms acquired by students as a result of analyzing the landform map of their own commune. The research hypothesis tested in this study is as follows: completing the worksheet based on students' analysis of the landform map of their commune led to an increase in students' knowledge about landforms.

METHODOLOGY

***Participants*.** The study, conducted during the 2024-2025 school year, involved 16 fourth-grade students aged 11-12. The students participated in educational activities in mixed-grade classes at two schools in Măguri-Răcătău commune: the Gymnasium School in Măguri-Răcătău and the Gymnasium School in Măguri-Bogdănești. The two classes were selected based on two criteria: the alignment of the research topics with the content specified in the fourth-grade geography curriculum and the students' ability to use thematic maps. Before participating in the study, the students were informed about the research objectives, the conditions under which the learning activities would take place, and the requirements they needed to follow. The students agreed to participate in the activity (pre-test, formative intervention, post-test) without receiving grades or rewards. The primary school teachers from both classes voluntarily participated in the study and organized the learning activities. The research adhered to ethical guidelines and ensured the confidentiality of students' personal data, in compliance with the provisions of the General Data Protection Regulation (GDPR). These students had previously participated in research focused on studying the mapped waterways of the commune (Bogdan, 2024).

***Procedure*.** In each class, the activity was conducted as part of a geography lesson. The students first completed the pre-test items (Table 2), then were assigned to individually observe the "Relief Map of Măguri-Răcătău Commune" (Figure 1) and fill out the "Worksheet" (Table 1) within 25 minutes. After analyzing the map and completing the worksheet, the teacher discussed with the students how to approach and solve the given tasks. The activity concluded with the students completing the post-test items (Table 2). This activity was similar to the one conducted by Bogdan (2024) regarding the study of the commune's waterways.

Table 1
Themes, objectives and tasks included in the "Worksheet"

Themes	Objectives	Tasks included in the "Worksheet"
1. General characteristics of the relief in the commune	1.1. Map legend analysis	1. Observe the map legend and fill in the blanks. The lowest relief step has an altitude (height) of … The highest relief step has an altitude (height) of … The conventional symbol by which mountain peaks are represented on the map is a …
	1.2. Identification of the maximum and minimum altitude of the relief in the commune	2. Observe the map legend, the area of the commune and fill in the blanks. In the commune of Măguri-Răcătău the maximum relief altitude is in Mount ..., at the top of …, being … m. In the commune of Măguri-Răcătău, the minimum relief altitude is in the part of …, on the course of the river …., being … m.
	1.3. Identification of the altitude variation	3. Observe the map and cross out the wrong or inappropriate words. In the commune of Măguri-Răcătău, the maximum relief altitude is in the south/north part of the territory. In the commune of Măguri-Răcătău, the minimum elevation of the relief is in the south/north of the territory. In the commune of Măguri-Răcătău, the elevation of the relief decreases from north/south to south/north.

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ISSN-L 2285-939X

	1.4. Identification of the major landforms prevalent in the commune	4. Observe the map legend, the area of the commune and cross out the wrong or inappropriate words. The major relief form with an altitude of over 800-1000 m is called a mountain/plateau/hill/plain. In the commune of Măguri-Răcătău, the areas with an altitude of over 810 m/under 810 m have the greatest extent. In the commune of Măguri-Răcătău, the relief form with the greatest extent is the mountain/hill/plateau.
2. Characteristics of the main mountain units in the commune	2.1. Identification of the location of the main mountain units	5. Observe the map and fill in the blanks. The main mountain relief unit located in the western part of the commune of Măguri-Răcătău is called …. The main mountain relief unit located in the eastern part of Măguri-Răcătău commune is called ….
	2.2. Identification of the maximum altitude of the main mountain units	6. Observe the map. If the statement is correct, circle the word True, if it is wrong, circle the word False. The maximum altitude of Muntelui Mare, on the territory of Măguri-Răcătău commune is 1826 m at the peak of Fieșului. True/False The maximum altitude of the Gilău Mountains, on the territory of Măguri-Răcătău commune is 1670 m at the peak of Silha. True/False
	2.3. Identification of the orientation of the main peak of the mountain units	7. Observe the map and fill in the blanks. The summit of the Gilău Mountains located in the center of Măguri-Răcătău commune is oriented in the direction of ... The summit of Muntelui Mare located in the east of Măguri-Răcătău commune is oriented in the direction of ...

Instruments. Two instruments were designed for data collection: a pre-test and a post-test (Table 2). Each test consists of 10 True/False items. A maximum score of 10 points is awarded for correctly completing each test. The items in both tests are similar, having been developed by the study's author based on the objectives intended to be achieved during the formative intervention stage and the content of the relief map used by the students.For each test, the score was calculated for every student participating in the study. Additionally, the proportion of each grade category and the group's average score were determined to identify differences between the students' results before and after the intervention.

Table 2

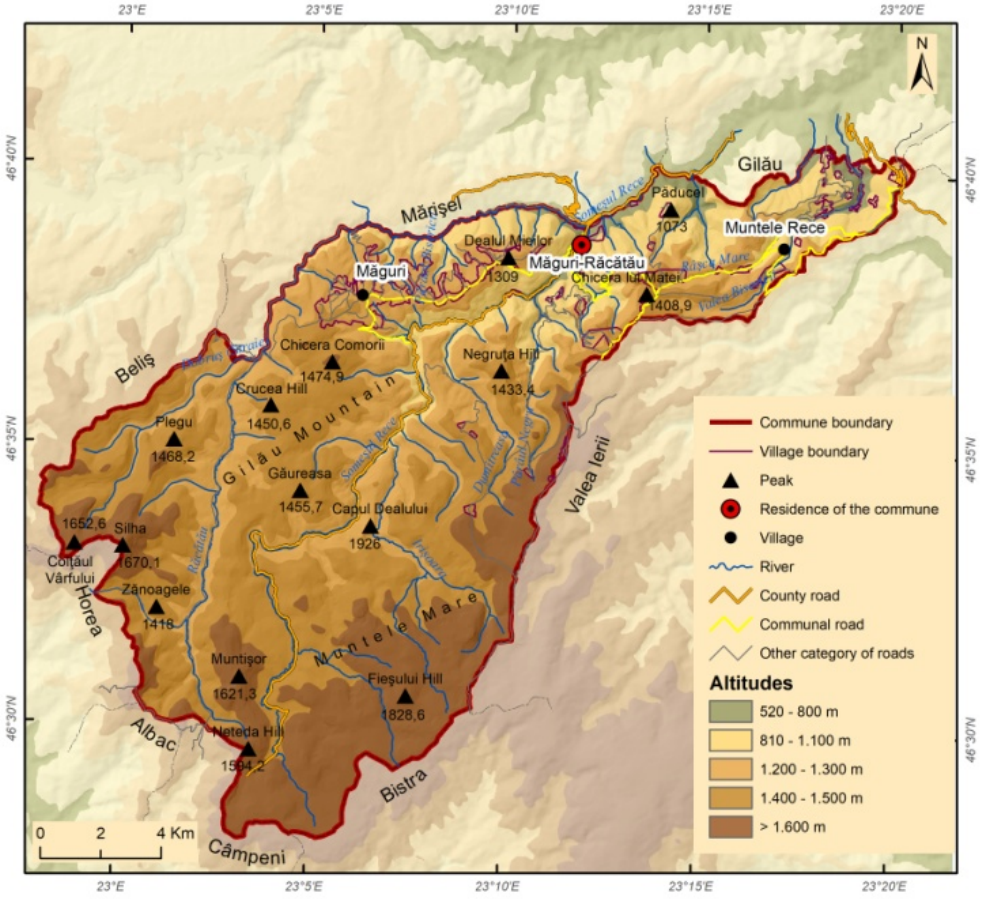
The pre-test and post-test used for data collection

Pre-test	Post-test
1. In the commune of Măguri-Răcătău, mountains predominate. T	1. In the Măguri-Răcătău commune, hills predominate.F
2. The relief has a high altitude in the northern part of the commune. F	2. The relief has a low altitude in the northern part of the commune. T
3. The locality of Măguri is located at an altitude of 1300-1400 m. F	3. The locality of Măguri is located at an altitude of 1200-1300 m. T
4. The locality of Măguri-Răcătău is located at an altitude of 520-800 m. T	4. The locality of Măguri-Răcătău is located at an altitude of about 810-1100 m. F
5. In the commune of Măguri-Răcătău, the maximum altitude is in Muntele Mare (1826 m). T	5. In the Măguri-Răcătău commune, the maximum altitude is at the top of Fieș (1826 m). T
6. The minimum altitude of the relief in the commune of Măguri-Răcătău is 450 m. F	6. The minimum altitude of the relief in the Măguri-Răcătău commune is 300 m. F
7. The Gilău Mountains are located in the western part of the commune of Măguri-Răcătău. T	7. In the eastern part of the Măguri-Răcătău commune, the Gilău Mountains are located. F
8. The peak of the Gilău Mountains located in the center of the commune of Măguri-Răcătău is oriented in the north-south direction. T	8.Muntele Mare is located in the eastern part of Măguri-Răcătău commune. T
9. In the western part of the Măguri-Răcătău commune is	9.The peak of the Gilău Mountains located in the center of Măguri-Răcătău commune is oriented in the

Romanian Review of Geographical Education
ISSN 2285-939X
ISSN-L 2285-939X

located Muntele Mare. F 10. The peak of Muntele Mare located in the eastern part of the Măguri-Răcătău commune is oriented in the east-west direction. F	east-west direction. F 10.The peak of Muntele Mare located in the eastern part of Măguri-Răcătău commune is oriented in the southwest-northeast direction. T

Figure 1
Relief map of the Măguri-Răcătău commune



RESULTS

Table 3 presents the results obtained by students in the tests. In the pre-test, the highest score (8 points) was achieved by 2 students, 7 students (43.75%) scored 7 points, and one student scored only 4 points. Lower scores were recorded for items 5, 8, and 10 (Table 4), indicating a lack of information regarding the maximum altitude within the territory of Măguri-Răcătău commune and a lack of spatial representations concerning the orientation of the Gilău Mountains and Muntele Mare in relation to the cardinal points.

In the post-test, administered after the formative intervention in which students analyzed the map and completed the tasks in the worksheet, 4 students (25%) achieved the maximum score, 2 students (12.5%) scored 9 points, and 5 students each (31.25%) scored 7 and 8 points. At the item level, the results show that students correctly identified the answers to most items. 62.5% of students correctly identified the maximum altitude in the commune. At the group level, the post-test average score (M = 8.31) was higher than the pre-test average score (M = 6.19). The 2.12-point difference between the two tests indicates that students' knowledge about the relief of the commune increased as a result of analyzing the map, thereby confirming the research hypothesis.

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ISSN-L 2285-939X

Table 3
Results of 4th grade students (N = 16) on pre-test and post-test

Scores	Pre-test		Post-test	
	Nr.	%	Nr.	%
4	1	6.25		
5	3	18.75		
6	3	18.75		
7	7	43.75	5	31.25
8	2	12.50	5	
9	-		2	12.50
10	-	-	4	25.00
Mean	6.19		8.31	

Table 4
Results of 4th grade students (N = 16) on pre-test and post-test items

Pre-test	Correct	Post-test	Correct
1. In the commune of Măguri-Răcătău, mountains predominate.	14	1.In the Măguri-Răcătău commune, hills predominate.	16
2. The relief has a high altitude in the northern part of the commune.	10	2. The relief has a low altitude in the northern part of the commune.	15
3. The locality of Măguri is located at an altitude of 1300-1400 m.	11	3. The locality of Măguri is located at an altitude of 1200-1300 m.	15
4. The locality of Măguri-Răcătău is located at an altitude of 520-800 m.	13	4. The locality of Măguri-Răcătău is located at an altitude of about 810-1100 m	11
5. In the commune of Măguri-Răcătău, the maximum altitude is in Muntele Mare (1826 m).	8	5. In the Măguri-Răcătău commune, the maximum altitude is at the top of Fieș (1826 m).	10
6. The minimum altitude of the relief in the commune of Măguri-Răcătău is 450 m.	9	6. The minimum altitude of the relief in the Măguri-Răcătău commune is 300 m.	12
7. The Gilău Mountains are located in the western part of the commune of Măguri-Răcătău.	11	7. In the eastern part of the Măguri-Răcătău commune, the Gilău Mountains are located.	12
8. The peak of the Gilău Mountains located in the center of the commune of Măguri-Răcătău is oriented in the north-south direction.	7	8.Muntele Mare is located in the eastern part of Măguri-Răcătău commune.	11
9. In the western part of the Măguri-Răcătău commune is located Muntele Mare.	10	9.The peak of the Gilău Mountains located in the center of Măguri-Răcătău commune is oriented in the east-west direction.	13
10. The peak of Muntele Mare located in the eastern part of the Măguri-Răcătău commune is oriented in the east-west direction.	8	10.The peak of Muntele Mare located in the eastern part of Măguri-Răcătău commune is oriented in the southwest-northeast direction.	16

DISCUSSIONS AND CONCLUSIONS

Analysis of the Worksheet. The tasks in the worksheet were coherently designed to help students independently apply a series of previously learned knowledge, concepts, or "geographical terms" acquired in second grade (mountain, hill, ridge, peak) and in fourth grade (altitude, cardinal points, orientation). The worksheet developed for this research aimed to indirectly guide the observation of the map in an analytical and systematic manner, to acquire and reinforce concepts related to landforms, and to develop the competence of analyzing maps and thinking analytically (Cîineanu et al., 2023).

ISSN 2285-939X
ISSN-L 2285-939X

To facilitate the accurate identification of information on the map, the worksheet includes tasks that require completing statements, choosing the correct answer from two or more options (two-choice: True/False; multiple constructed responses). Even though all students should have the necessary knowledge stored in their long-term memory to complete the worksheet, there is a risk that, in reality, they may have certain gaps. If students are unfamiliar with the terms used in the test items and worksheet tasks, they might fail to solve them, complete them incorrectly, or choose answers randomly. The worksheet serves as a feedforward tool (Dulamă & Ilovan, 2016), designed to indirectly guide students toward deducing the correct answer (Pahome, 2023b) and to prevent situations where some students cannot complete the tasks or do so incorrectly. With the same feedforward function, the teacher can provide a text containing essential information needed by students (e.g., definitions), an approach suggested in other studies as well (Bogdan, 2024). The task of analyzing the relief map has a high degree of difficulty and is challenging for students since they have not previously analyzed a hypsometric map independently. Thus, the task places students within their zone of proximal development (Vygotsky, 1962).

Analysis of the Learning Activity. During the formative intervention, students individually analyzed the relief map and completed their worksheets. Students in both classes participate in formal educational activities in simultaneous classes; therefore, they have fewer opportunities for direct oral communication with the teacher during a lesson and may struggle to request clarifications while completing tasks. This is because the teacher must simultaneously attend to students from the other class, who are covering a different subject. In the context of simultaneous class instruction, the teacher has less opportunity to monitor the activity of students working individually on the worksheet tasks.

In this learning activity, students develop the general competence “3. Relating the surrounding reality to its cartographic representation”, as outlined in the school curriculum for the subject "Geography" (Ministry of National Education, 2014b, p. 4), a crucial skill in today's knowledge-based society (Ilovan, 2012). By analyzing the relief map, students also develop the specific competence "3.2. Using symbols and other conventional representations" (Ministry of National Education, 2014b, p. 4). In this learning scenario, through the observation of conventional symbols included in the map legend, students can deduce the essential elements represented on the hypsometric map. They recognize the necessity of representing watercourses and human settlements on the hypsometric map to facilitate spatial orientation.

Additionally, students develop the specific competence "3.1. Identifying the position of elements represented on the map" (Ministry of National Education, 2014b, p. 6). By analyzing the legend and map content, students establish the correlation between a landform and the color used to represent it on the map. By examining the extent of an area represented in a particular color, students deduce the geographical position of that landform within the studied area.

On the map, students determine the position of each landform unit based on the coordinate system, cardinal, and intercardinal points. In the pre-test, students had difficulty establishing the position or orientation of the ridges of two mountain units represented on the map. This may have been due to a lack of understanding of the concept of "mountain ridge" or because these ridges or interfluves do not always follow a clearly linear spatial arrangement. In a previous study, the number of students who correctly identified the direction of water flow in this area increased in the post-test compared to the pre-test (Bogdan, 2024). However, some students may still face difficulties in determining the orientation of certain areas in relation to intercardinal points.

During this learning activity, students develop the specific competence "3.3. Accurately relating the position of elements on cartographic representations" (Ministry of National Education, 2014b, p. 6). By analyzing the hypsometric map, students were asked to establish connections between: the geographical position of a locality, its altitude, and the landform on which it is situated; the geographical position of a mountain ridge and the valleys carved by flowing waters; the proportion of a landform type relative to other landforms.

Overall, through this activity, students develop the specific competence "3.4. Using simple graphic and cartographic representations" (Ministry of National Education, 2014b, p. 6). The hypsometric map used in the activity contains essential information that fourth-grade students can independently decode, guided by the teacher through the worksheet.

ISSN 2285-939X
ISSN-L 2285-939X

In the learning activity organized within the formative intervention, students develop the general competency "1. Presenting observable reality using general and specific terminology" (Ministry of National Education, 2014b, p. 4), a necessary competency in a knowledge-based society (Ilovan, 2012). Although specific geographical terms are not explicitly included on the relief map, students are required to identify conventional symbols representing certain geographical terms (peak, locality, flowing water, etc.), thereby developing the specific competency "1.1. Identifying geographical terms in texts/contexts/learning situations" (Ministry of National Education, 2014b, p. 5).

Students also develop the specific competency "1.3. Using simple geographical terms in familiar contexts" (Ministry of National Education, 2014b, p. 5). To solve the test items and the tasks in the worksheet, students must evaluate the correctness of a statement constructed by the teacher or complete a given statement. In the case of dual-choice or multiple-choice items, students might randomly choose the correct answer. In the case of the worksheet, tasks requiring constructed responses help students select the correct answer more effectively, but in tests, dual or multiple-choice items may lead to a random assessment of students' knowledge. To facilitate the development of the ability to present observable reality using general and specific terminology, students could be asked to write a text about the relief of their commune. This exercise would also help them develop their writing skills (Dulamă et al., 2011).

An important condition for correctly solving the tasks and ensuring students' understanding of new information about relief is the quality and quantity of prior knowledge stored in their long-term memory. Regarding the major landforms on continents, by the second grade, students should know that the Earth's surface is not smooth, as represented on a globe (which is a model), but rather uneven; that relief consists of all the irregularities of the Earth's crust (Dulamă, 2011); that there are continents and oceans; that major landforms exist on continents (mountains, hills, plateaus, plains); and that a landform is characterized by altitude, the shape of interfluves (or ridges in the case of hills and mountains), valleys, and slopes (Dulamă, 2010d).

In the second grade, students should be able to recognize major landforms in the field or in photographs and justify their identification with arguments, explaining why a given image shows a mountain. Students should also understand that a valley is a concavity carved by flowing water and that slopes - the inclined parts or surfaces of a hill or mountain - tilt in opposite directions relative to a watercourse (Dulamă, 2010e).

When analyzing the relief represented on a map, students use the knowledge integrated into the general competency "5. Problem-solving based on sorting and representing data" (Ministry of National Education, 2013, p. 3) and the specific competencies acquired in preparatory class ("5.1. Sorting/classifying objects/materials, etc., based on a given criterion") and first grade ("5.1. Sorting and classifying data from the surrounding environment based on two criteria") (Ministry of National Education, 2013, p. 16) in the subject "Mathematics and Environmental Exploration." Students classify landforms represented on the map based on visible aspects: altitude (mountains); shape of the irregularities (valleys are concave; mountains are convex); ridge orientation; and ridge shape.

In the fourth grade, students should identify, based on given criteria (e.g., altitude, extent of interfluves and slopes), the similarities and differences between the major landforms of continents (mountains, hills, plateaus, plains) and between specific landforms, such as the Gilău Mountains and Muntele Mare. Additionally, students should be able to deduce the slope of the relief based on the proximity or distance between contour lines on the hypsometric map: if the contour lines are close together, the slope is steeper (e.g., near the locality of Măguri-Răcătău), whereas if they are farther apart, the slope is gentler (e.g., in the locality of Măguri-Bogdănești). The ability of fourth-grade students to perform such geographical reasoning is important for practicing geographical thinking (Dulamă, 2010e).

From a systemic and holistic perspective, in this learning activity, through the analysis of relief in a territorial unit, students began to develop the competence to analyze a mountain system (Dulamă, 2010b) and to further develop their ability to analyze thematic maps related to relief (hypsometric maps or landform maps) (Dulamă, 2006, 2010d). Students identified and compared relief features based on visible characteristics decoded with the help of conventional symbols included in the map legend. They learned to analyze certain characteristics of landforms in a given territory individually, using the worksheet, which guides them toward a model or "standard" (Golu, 2007).

ISSN 2285-939X
ISSN-L 2285-939X

From a cognitive perspective, in this activity, students conducted an "empirical," sensory analysis (Zlate, 1999) during the observation, identification, and perception of landform names and characteristics (direction or orientation of ridges, ridge length, sinuous or linear aspect of ridges, altitude of a point or area).

In real life or photographs, students conduct relief analysis at a concrete level. When using maps, because they employ various cognitive operations (comparing landforms; evaluating length, altitude, shape, and trajectory of mountain ridges; ranking landforms: continents and first-order ocean basins; second-order major landforms on continents), they perform analysis at an abstract level (Zlate, 1999). Students learned to compare landforms based on logical criteria (Golu, 2007) (ridge orientation or direction; ridge length or width).

Within this relief map analysis activity, students practiced analysis, which is considered in specialized literature as: a fundamental cognitive operation (Golu, 2007; Zlate, 1999); a cognitive process (Anderson et al., 2001); and a scientific research method (Romanian Academy, 2009, 2010; Marcu, 2000). The objectives set for this activity fall within Bloom's taxonomy under the category "Analysis" and the subcategory "Analysis of elements" (Krathwohl, 2002).

At the end of the study, it was observed that students need teacher mediation (Vygotsky, 1962) to further develop their ability to analyze and interpret hypsometric maps, particularly in understanding spatial representation (Ilovan, 2024), the relationship between relief and human settlements, the anthropic impact on relief (Rus et al., 2020), the relationship between relief and local identity traits (Ilovan, 2015), and the relationship between relief and regional development (Ilovan, 2013).

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