



## USE OF WORKSHEET IN ANALYSIS OF LANDSCAPES ON MAPS AND IN PHOTOGRAPHS, IN PRIMARY EDUCATION

Nicoleta-Ioana BOGDAN

Secondary School in Măguri-Bogdănești, Cluj County, ROMANIA  
[nicoletabogdan84@gmail.com](mailto:nicoletabogdan84@gmail.com)

DOI: <http://doi.org/10.24193/RRGE20262>

### ABSTRACT

*The aim of this study is to analyze the effects of the use by 4th grade students (N = 16) of a worksheet to analyze the landscapes in the territorial administrative unit, represented on a thematic map. The students went through three stages: they solved a pre-test, they individually analyzed the landscapes in the photographs and solved the tasks in a worksheet, based on the landscape map, and then they solved a post-test. The results show that the formative intervention had a strong effect on the students' knowledge about the landscapes in the environment in which they live and on their spatial analysis competence.*

**Keywords:** *landscape map, worksheet, landscape, forest, analytical thinking, simultaneous learning, individual activity*

### Cite this article as:

Bogdan, N.-I. (2026). Use of worksheet in analysis of landscapes on maps and in photographs, in primary education. *Romanian Review of Geographical Education*, 15(1), 46-60. <http://doi.org/10.24193/RRGE20262>

### INTRODUCTION

In recent decades, researchers in Romania have investigated educational needs in rural areas (Andrianu & Bulău-Olaru, 2025), rural education (Tomulețiu & Moraru, 2010), education, culture, and health in rural areas (Pîrvu & Țenea, 2021), and education in rural environments from the perspective of sustainable development (Dulamă, 2005). Studies have focused on educational programs in national parks (Havadi-Nagy & Ilovan, 2013), environmental education in protected areas (Ilieș et al., 2017), ecological education and education for sustainable development (Ilovan et al., 2018), outdoor education (Isopescu et al., 2019) and education in nature (Deac et al., 2019), as well as education for biodiversity conservation (Antofie & Sand Sava, 2015).

In several studies, researchers have shown interest in rural settlements, analyzing rural space development (Mateoc-Sîrb et al., 2016), rural landscapes (Drăgan et al., 2024), residents' representations of nature and the environment in rural areas (Dincă et al., 2021), rural identity and education for equestrian tourism (Turșan et al., 2016), the valorization of pastures through nature-based tourism (Vijulie et al., 2024), sustainable landscapes (Loos et al., 2016), as well as the structure and components of rural settlements (Ilie et al., 2020).

A large number of studies have been dedicated to forests in Romania, analyzing forests and ecosystem services (Crețan et al., 2024), teachers' perceptions and actions regarding forests (Dulamă et al., 2017), the role of forests in recreation and landscape protection (Pintilii, 2022), the effects of creativity on forest ecosystems in mountainous areas (Doncean, 2012), forest management from a recreational perspective (Tudoran et al., 2024), improving urban quality of life by transforming forests into forest parks



(Dumitras et al., 2010), forest education (Dulamă et al., 2016), and the formation of geographical representations during hiking activities (Drînda, 2020).

Researchers in Romania are also interested in students' study of landscapes (Buzilă et al., 2017a; Dragan et al., 2024), mountain landscapes and their dysfunctions (Șomîtcă, 2017b), the anthropogenic impact on vegetation and relief (Rus et al., 2020), territorial dysfunctions (Popa et al., 2017), knowledge of the mountain environment (Vidrean, 2020), and the study of landscapes through online applications and electronic devices (Rus et al., 2019). They also examine the development of the competence to interpret geographical landscapes (Popescu, 2010), as well as the definition and classification of landscapes (Baciu, 2014; Drăguț, 2000).

In this research, we are interested in primary school students acquiring knowledge about landscapes as the "visible expression of the environment" (Baciu, 2014, p. 19), landscapes that have their own physiognomy and a certain spatial structure resulting from the interaction between "abiotic, biotic, and anthropogenic factors" (Drăguț, 2000; Baciu, 2014, p. 19). The aim of this study is to analyze the effects of using a worksheet and the analysis of thematic maps and photographs by students learning in multi-grade classrooms.

## METHODOLOGY

### *Participants*

In this study, 16 students from two lower secondary schools located in the villages of Măguri-Răcățău ( $N = 10$ ) and Măguri-Bogdănești ( $N = 6$ ), within the administrative territorial unit Măguri-Răcățău, Cluj County, participated. This area represented the study site of the research. These schools were selected based on the criterion of the researcher's residence and workplace being located in the same commune as the schools (Bogdan, 2024, 2025).

The research was conducted in 4th grade classes, where students learn in multi-grade settings. The selection of 4th grade classes was based on two criteria: the presence of the subject "Geography" in the national curriculum and the inclusion, in the Geography syllabus for 4th grade (Ministry of National Education, 2014), of content elements related to vegetation, human settlements, and landscapes from the local horizon, which were selected to be addressed with students during the experimental activity. The 4th grade was also chosen because students at this level are capable of using and comparing thematic maps (Bogdan, 2024, 2025). The research was conducted during regular classroom activities, and students were naturally included in the study, without division into experimental and control groups. These students had previously participated in two studies in which they analyzed the relief map and the hydrographic map of the administrative territorial unit Măguri-Răcățău (Bogdan, 2024, 2025).

At the beginning of the research, students were informed about the objectives of the study, the conditions under which the research would take place, and the requirements to be followed (voluntary participation in all activities, without receiving any rewards). Parental consent for students' participation in the study was obtained through a written agreement. The teachers conducting activities in these classes participated voluntarily in the research. Throughout the study, the presentation and interpretation of the results complied with the "General Data Protection Regulation" (2016) and followed ethical standards specific to educational research methodology.

### *Research design*

The study employed a pre-test – intervention – post-test design with a single group. This type of research design allows for the evaluation of changes in students' performance as an effect of an educational intervention, by comparing the results obtained before and after its implementation.

### *Procedure*

Students carried out the activities during geography lessons, in the classroom. The research involved three stages. First, students completed a test to assess their level of knowledge prior to the



intervention. After completing the pre-test items (Table 1), students in each class were asked to carefully and individually observe the “Map of landscapes in the administrative territorial unit Măguri-Răcățău” (Figure 1) and the “Relief map of the administrative territorial unit Măguri-Răcățău” (Figure 2), and to complete the “Worksheet” (Table 2). Students had 25 minutes to complete the tasks in the worksheet. The teachers discussed with the students how to solve these tasks. At the end of the intervention, students took a similar test to evaluate their progress. The activity concluded after completing the post-test items (Table 1).

### Instruments

Students’ performance was assessed using two tests equivalent in structure and level of difficulty: a pre-test and a post-test. These tests evaluated the same content and competencies to ensure comparability of results. Each test consisted of 20 dual-choice items of the True/False type. The items in the pre-test and post-test were similar, being designed according to the objectives set for the formative intervention stage and based on the content of the photographs, the relief map, and the landscape map used by the students. The maximum possible score for each test was 20 points. For each student, the following were recorded: pre-test score, post-test score, and gain, calculated as the difference between post-test and pre-test scores.

**Table 1**

*Results of 4<sup>th</sup> grade students on pre-test and post-test items*

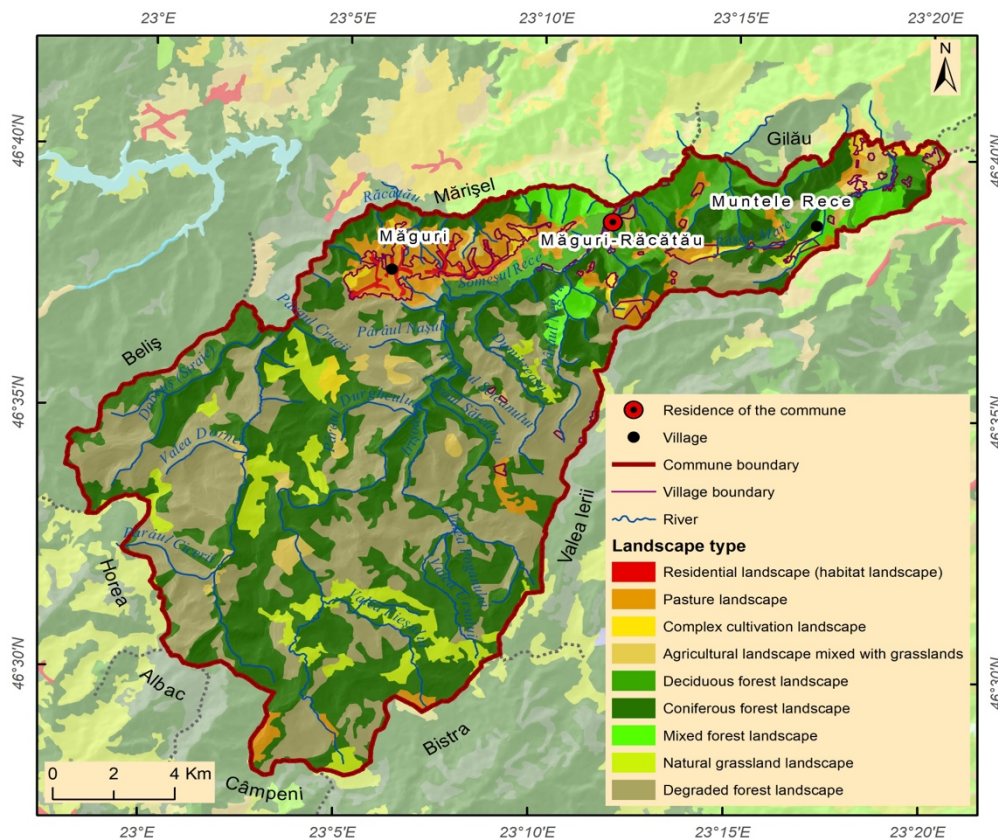
Pre-test	Correct	Post-test	Correct
1. There are urban landscapes in the villages of Măguri and Muntele Rece. <b>F</b>	15	1. There are rural landscapes in the settlements of Măguri-Răcățău, Măguri, Muntele Rece, and Huedin. <b>F</b>	16
2. In the rural landscape, small houses, animal shelters, and cultivated land can be observed. <b>T</b>	16	2. In urban landscapes, households can be observed that include the dwelling, animal shelters, storage spaces, and the surrounding land. <b>F</b>	16
3. In the landscape of Măguri village, households with sloping land enclosed by fences can be observed. <b>F</b>	14	3. In the landscape of Măguri village, households with slightly sloping, extensive land enclosed by fences can be observed. <b>T</b>	16
4. In the landscape of Muntele Rece village, households with small plots between them can be observed, arranged along the course of the Someșul Rece River. <b>F</b>	12	4. In the landscape of Muntele Rece village, closely spaced households can be observed, with small plots between them, arranged along the course of the Râșca River. <b>T</b>	12
5. The pasture landscape is the most extensive in the village of Măguri-Răcățău. <b>T</b>	16	5. The pasture landscape is most extensive in the village of Măguri. <b>T</b>	16
6. Pasture landscapes occupy small, isolated areas near the villages in Măguri-Răcățău commune. <b>T</b>	12	6. Pasture landscapes occupy small, isolated areas located far from the villages in Măguri-Răcățău commune. <b>T</b>	16
7. In pasture landscapes, tall grasses and grazing animals can be observed. <b>F</b>	11	7. In pasture landscapes, short grasses and grazing animals can be observed. <b>F</b>	16
8. In the landscape of meadows used by people, short grasses that are cut for hay can be observed. <b>F</b>	16	8. In the landscape of meadows used by people, tall grasses that are cut for hay can be observed. <b>T</b>	16
9. Landscapes of meadows mowed by people occupy small, isolated areas on the ridges in Măguri-Răcățău commune. <b>F</b>	12	9. Landscapes of meadows mowed by people occupy small, isolated areas near the villages in Măguri-Răcățău commune. <b>T</b>	5
10. Natural meadow landscapes, which are not used (mowed) by people, are located on the ridges of the Gilău Mountains and Muntele Mare. <b>T</b>	10	10. Natural meadow landscapes, which are not used by people, are located only on the slopes of the Gilău Mountains and Muntele Mare. <b>F</b>	16



11. The deciduous forest landscape is visible in the southern part of Măguri-Răcățău commune. <b>F</b>	16	11. The deciduous forest landscape is visible in the northern part of Măguri-Răcățău commune. <b>T</b>	16
12. The deciduous forest landscape consists of trees with needle-shaped leaves. <b>F</b>	16	12. The deciduous forest landscape consists of trees with broad leaves. <b>T</b>	16
13. The deciduous forest landscape includes trees of different species. <b>T</b>	15	13. The deciduous forest landscape includes trees with falling leaves, of different species. <b>T</b>	16
14. The coniferous forest landscape is visible in the southern part of Măguri-Răcățău commune. <b>T</b>	16	14. The coniferous forest landscape is visible in the northern part of Măguri-Răcățău commune. <b>F</b>	16
15. The coniferous forest landscape consists of trees with broad leaves. <b>F</b>	16	15. The coniferous forest landscape consists of trees with needle-shaped leaves. <b>T</b>	16
16. The mixed forest landscape consists of trees with deciduous leaves. <b>F</b>	8	16. The mixed forest landscape consists of both deciduous trees and conifers. <b>T</b>	16
17. The mixed forest landscape is visible on mountains with lower altitude. <b>T</b>	7	17. The mixed forest landscape is visible on mountains with higher altitude. <b>F</b>	6
18. The mixed forest landscape is visible in the southern part of Măguri-Răcățău commune. <b>F</b>	5	18. The mixed forest landscape is visible in the northern part of Măguri-Răcățău commune. <b>T</b>	7
19. The degraded forest landscape was formed by clear-cutting the coniferous forest. <b>A</b>	11	19. The degraded forest landscape was formed by clear-cutting the coniferous forest. <b>T</b>	14
20. Degraded forest landscapes are more extensive in the northern part of Măguri-Răcățău commune. <b>F</b>	7	20. Degraded forest landscapes are more extensive in the southern part of Măguri-Răcățău commune. <b>T</b>	6

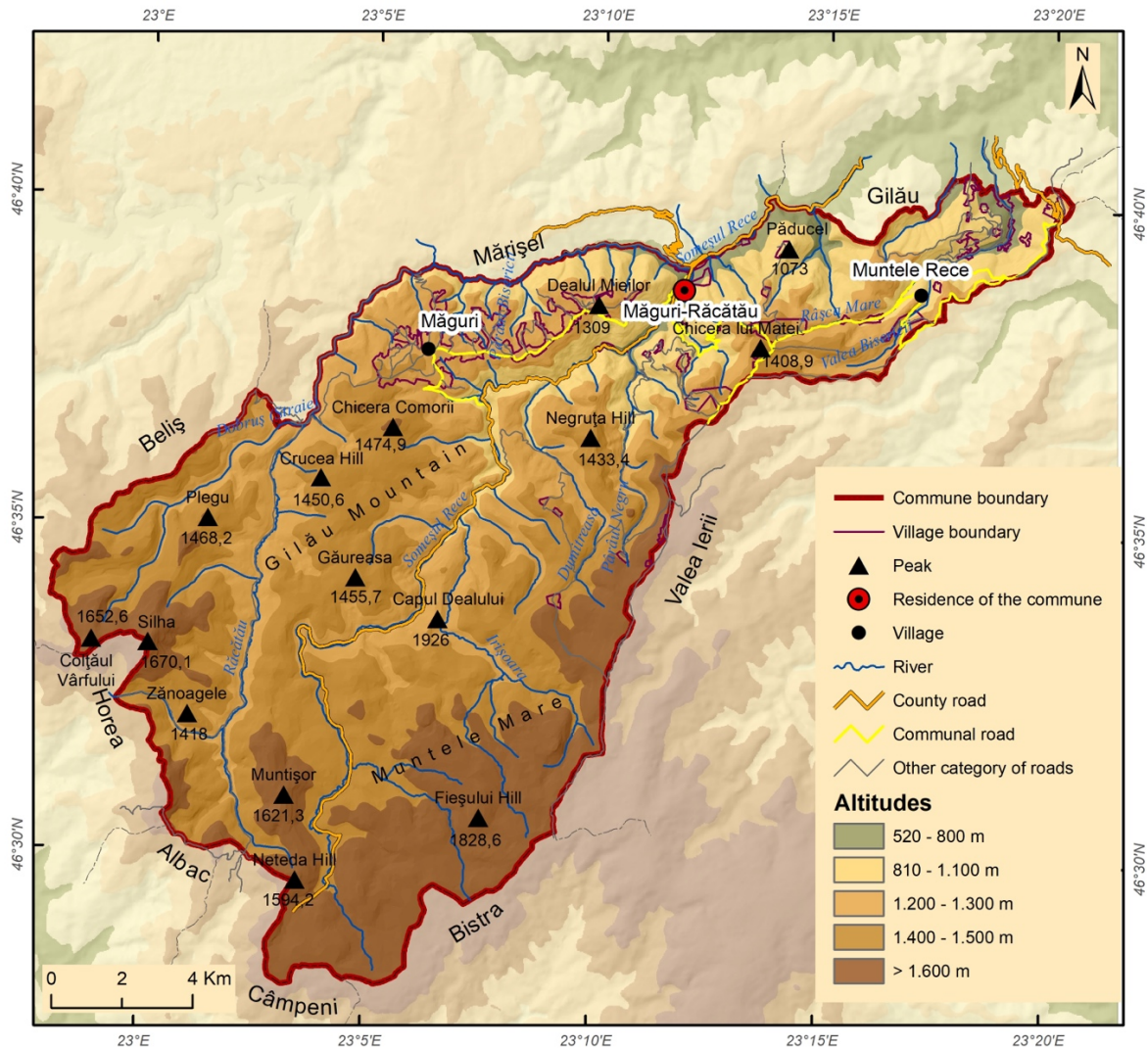
**Figure 1**

Map of landscapes in the administrative territorial unit Măguri-Răcățău





**Figure 2**  
Relief map of the administrative territorial unit Măguri-Răcățău



(source: Bogdan, 2025, p. 21)

The worksheet includes tasks that require the analysis of the “Map of landscapes in the administrative territorial unit Măguri-Răcățău.” The tasks are correlated with seven types of landscapes: rural landscape, pasture landscape, meadow landscape, deciduous forest landscape, coniferous forest landscape, mixed forest landscape, and degraded forest landscape. For the analysis of each landscape, tasks are formulated that can be solved by observing the photographs in the worksheet, by analyzing the relief map, and by analyzing the landscape map.





In analyzing each landscape in the photographs and in relation to the two maps, students complete tasks in which they must decide whether a statement is true (correct) or false (incorrect) (dual choice), tasks in which they must cross out from a statement a word they consider incorrect or inappropriate, in comparison with another word provided by the teacher (dual choice), and tasks in which they must fill in a blank space in a sentence with an appropriate word.

By completing these tasks, the aim is for students to achieve the following objectives: to identify the characteristics of each landscape in the photographs, to describe each type of landscape and its components, to characterize each type of landscape, to locate each type of landscape within the administrative territorial unit, to analyze the legend of the landscape map, and to specify the types of landscapes present in the administrative territorial unit.

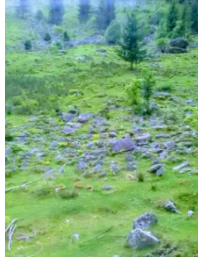





**Table 2**


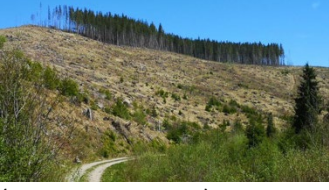
*Homework and tasks in the "Worksheet"*

The tasks in the "Worksheet"	Visual material
<b>Theme 1. Rural landscape</b>	
<p>The rural landscape exists in rural settlements (villages). <b>A/F</b>            In rural landscapes, rural households can be observed, including the dwelling, animal shelters, storage spaces, and the surrounding land. <b>A/F</b>            In Măguri village, the distance between houses/households is <b>large</b>/small.            In Măguri village, the land belonging to a household is enclosed with ...            In Măguri village, the land is enclosed to prevent animals from moving from one plot to another. <b>A/F</b>            In Măguri village, very steep land predominates. <b>A/F</b>            In Măguri village, there are extensive meadows around the houses. <b>A/F</b>            In Măguri-Răcățău village, many houses are located along a flowing watercourse. <b>A/F</b>            In Măguri-Răcățău village, the distance between houses/households is <b>large</b>/<b>small</b>.            In Măguri-Răcățău village, households occupy smaller areas than those in Măguri village. <b>A/F</b></p>	<p>Photos</p>  <p>(Sursă: Roba, 2019)</p>  <p>(Sursă: Pleșa, 2012)</p>
<p>Măguri village is located on the ridge of the Gilău Mountains. <b>A/F</b>            Muntele Rece village is located near the course of the Râșca River. <b>A/F</b>            Măguri-Răcățău village is located near the course of the Someșul Rece River. <b>A/F</b></p>	<p>Relief map</p>
<p>Residential landscapes are represented on the map with the color ....            Residential landscapes exist in the localities ...            The most extensive residential landscapes in Măguri-Răcățău commune are in the village of ...            The least extensive areas with residential landscapes are in the localities ...</p>	<p>Map of landscapes</p>
<b>Theme 2. Pasture landscape</b>	
<p>In Măguri-Răcățău commune, ... graze on pastures.            On a given pasture, animals of the same species (e.g., cows) usually graze. <b>A/F</b>            Animals graze grass on pastures from early spring until late autumn. <b>A/F</b>            On pastures, plants are tall. <b>A/F</b></p>	<p>Photo</p>  <p>(sursă: Drînda, 2020)</p>
<p>Several pasture areas are located near the ridge of Mount ...            Extensive pasture areas are found in the northern part of the ridge of the ... Mountains.</p>	<p>Relief map</p>
<p>Pasture landscapes are represented on the map with the color ....            The most extensive pastures are in the village of ...            Pastures occupy small, isolated areas in the <b>northern</b>/southern part of Măguri-Răcățău commune.</p>	<p>Map of landscapes</p>
<b>Theme 3. Meadow landscape</b>	
<p>On meadows, plants are tall. <b>A/F</b>            Plants on meadows are cut with ... <b>A/F</b>            Cut plants are left to dry in order to obtain ...            The dried plants are gathered to obtain ...            Mown meadows are enclosed with ...            Meadows that are mown by people are called secondary meadows. <b>A/F</b>            Meadows that are not mown by people are called natural meadows. <b>A/F</b></p>	<p>Photos</p>  <p>(sursă: Drînda, 2020)</p>



<p>Plants in natural meadows located on mountain tops are tall. <b>A/F</b>          In natural mountain meadows there are shrubs, trees, and rocks. <b>A/F</b>          Natural meadows develop only on sloping surfaces. <b>A/F</b></p>	 <p>(sursă: Drînda, 2020)</p>
<p>Natural meadows exist in the <b>southern</b>/northern part of the Gilău Mountains.          Natural meadows exist in the <b>southern</b>/northern part of Muntele Mare.</p>	<p>Relief map</p>
<p>Meadow landscapes are represented on the map with the color ....          Natural meadows occupy larger, isolated areas in the <b>southern</b>/northern part of Măguri-Răcățău commune.          Natural meadows are located at greater distances from the settlements in the commune. <b>A/F</b></p>	<p>Map of landscapes</p>
<p><b>Theme 4. Deciduous forest landscape</b></p>	
<p>In deciduous forests, there are trees of different species. <b>A/F</b>          Tree species in deciduous forests differ in crown shape and leaf color. <b>A/F</b>          Trees in deciduous forests are not taller than the houses in Măguri-Răcățău commune. <b>A/F</b>          Trees in deciduous forests have broad leaves. <b>A/F</b>          Trees in deciduous forests have leaves during winter. <b>A/F</b></p>	<p>Photos</p>  <p>(sursă: Drînda, 2020)</p>  <p>(Pahome, 2023c, p. 40)</p>
<p>In Măguri-Răcățău commune, deciduous forests develop in areas of <b>lower</b>/higher mountain altitude.          In Măguri-Răcățău commune, deciduous forests develop on the highest mountain ridges. <b>A/F</b></p>	<p>Relief map</p>
<p>Deciduous forest landscapes are represented on the map with the color ....          Deciduous forests are more extensive in the <b>northern</b>/southern part of Măguri-Răcățău commune.          The most extensive deciduous forests are located near the locality ...</p>	<p>Map of landscapes</p>
<p><b>Theme 5. Coniferous forest landscape</b></p>	
<p>In coniferous forests, trees of the same/different species predominate. <b>A/F</b>          Conifers have cone-shaped crowns with pointed tops. <b>A/F</b>          Trees in coniferous forests are not taller than the houses in Măguri-Răcățău commune. <b>A/F</b>          Trees in coniferous forests do not have leaves during winter. <b>A/F</b>          Conifers lose all their leaves in autumn. <b>A/F</b></p>	<p>Photo</p>  <p>(sursă: Roba, 2019)</p>
<p>Coniferous forests occupy <b>larger</b>/smaller areas in the Gilău Mountains.          Coniferous forests occupy <b>larger</b>/smaller areas in Muntele Mare.          Coniferous forests occupy high-altitude areas in the Gilău Mountains. <b>A/F</b>          Coniferous forests occupy low-altitude areas in Muntele Mare. <b>A/F</b></p>	<p>Relief map</p>
<p>Coniferous forest landscapes are represented on the map with the color ....          In Măguri-Răcățău commune, coniferous forests occupy <b>larger</b>/smaller areas than deciduous forests.</p>	<p>Map of landscapes</p>



Coniferous forests are more extensive in the northern/ <b>southern</b> part of Măguri-Răcățău commune.	
<b>Theme 6. Mixed forest landscape</b>	
In mixed forests, there are both deciduous trees and conifers. <b>A/F</b> Mixed forests are located on mountains with lower altitude. <b>A/F</b> Mixed forests are located on the slopes of lower-altitude mountains. <b>A/F</b>	Photo  (captură Google Street)
Mixed forests are located in the southern/ <b>northern</b> part of Muntele Mare.	Relief map
Mixed forest landscapes are represented on the map with the color .... Mixed forests are located south and west of Măguri-Răcățău locality. <b>A/F</b>	Map of landscapes
<b>Theme 7. Degraded forest landscape</b>	
The degraded forest landscape was formed by clear-cutting coniferous forests. <b>A/F</b> The coniferous forest located on the mountain slope was cut. <b>A/F</b> Only a portion of the coniferous forest remained on the mountain ridge. <b>A/F</b>	Photo  (Sursa: Soica, 2020)
Degraded forest landscapes occupy large areas in the Gilău Mountains. <b>A/F</b> Degraded forest landscapes occupy large areas in Muntele Mare. <b>A/F</b>	Relief map
Degraded forest landscapes are represented on the map with the color .... In Măguri-Răcățău commune, degraded forest landscapes occupy <b>larger</b> /smaller areas than coniferous forests. Degraded forest landscapes are more extensive in the northern/ <b>southern</b> part of Măguri-Răcățău commune.	Map of landscapes

### Data analysis

The data were analyzed using descriptive and inferential statistical methods (Magdaș, 2018). Descriptive statistics (mean, standard deviation, minimum and maximum values) were calculated for the pre-test, post-test, and gain scores. The Shapiro–Wilk test was used to assess the normality of the distribution of differences. To compare pre-test and post-test scores, the paired-samples t-test was applied. To measure the effect size, Cohen’s d coefficient was calculated. To confirm the results, the non-parametric Wilcoxon Signed-Rank test was also used. An analysis of individual progress was conducted, and the Pearson correlation coefficient between the initial score and the gain was calculated.

## RESULTS

The statistical analysis revealed an increase in scores from the pre-test ( $M = 15.06$ ,  $SD = 2.21$ ) to the post-test ( $M = 17.75$ ,  $SD = 1.39$ ), with an average gain of 2.69 points (Table 3). The normality test (Shapiro–Wilk,  $W = 0.888$ ,  $p = 0.052$ ) indicated an approximately normal distribution of differences, allowing the use of the paired-samples t-test. The results of the paired-samples t-test showed a statistically significant difference between pre-test and post-test scores,  $t(15) = 10.60$ ,  $p < 0.001$ . The effect size was very large ( $d = 2.65$ ), indicating a strong impact of the intervention. All students showed progress as a result of their participation in the activity. The Wilcoxon test confirmed the results ( $p < 0.001$ ). In addition, a strong negative correlation was identified between the initial score and the gain ( $r = -0.885$ ,  $p < 0.001$ ), suggesting that students with lower initial performance benefited the most from the intervention.



**Table 3**

*Descriptive statistics of pre-test and post-test scores*

	<i>M</i>	<i>SD</i>	<b>Minim</b>	<b>Maxim</b>
<b>Pre-test</b>	15.06	2.21	10.00	18.00
<b>Post-test</b>	17.75	1.39	15.00	20.00
<b>Gain</b>	2.69	1.01	1.00	5.00

At the item level, the pre-test results show that students identified the correct answer for 7 items (35%), while in the post-test they identified the correct answer for 14 items (70%) (Table 1). Lower scores were recorded for items 7, 9, 10, 17, 18, and 20, indicating a lack of knowledge regarding the extent of natural meadows on the mountain ridges within the territory of Măguri-Răcățäu commune, as well as regarding mixed forest landscapes and degraded forest landscapes. The post-test results show that students answered more correctly some items related to the extent of natural meadows and the composition of deciduous forests, which had posed difficulties in the pre-test; however, students still encountered difficulties regarding forest landscapes

## DISCUSSION AND CONCLUSIONS

### *Analysis of the worksheet*

The worksheet designed for this research aimed to indirectly guide the analytical and systematic observation of landscapes in photographs (Antal et al., 2020a,b) and on the landscape map, to support the acquisition and consolidation of concepts (Dulamă, 2010a) related to landscape and types of landscapes, to develop the competence of analyzing landscape maps (Dulamă, 2006, 2014), and to foster analytical thinking (Cîineanu et al., 2023). The tasks in the worksheet were coherently designed to help students independently capitalize on their prior knowledge about the locality in which they live (Dulamă, 2010d) and to connect it with previously learned knowledge, concepts, or “geographical terms” studied in 2nd grade (relief, mountain, hill, ridge, peak, meadow, pasture) and in 4th grade (slope, altitude, forest) (Dulamă, 2010b, 2011).

To facilitate the discovery of correct information in photographs (Antal et al., 2020a,b) and on the landscape map, and to establish relationships between the location of a landscape depending on relief and the presence of people in the territory, the worksheet includes tasks that require completing statements based on the analysis of visual materials or through deduction, choosing the correct answer from two or more statements (two variants: True/False; correct/incorrect). These methods of guiding observation have been considered effective in previous studies (Pahome, 2022a, 2023a,b; Vereş et al., 2024).

The formulation of tasks is based on the premise that students should possess, in their long-term memory, the knowledge necessary to complete the worksheet; however, in reality, there is a risk that they may have certain gaps. If students do not understand some of the terms used in the construction of the tasks, they may solve them randomly or incorrectly. To avoid the effects of this situation, the teacher asks students to explain orally how they solved the tasks. By verifying how students solve the tasks, the necessary conditions are ensured for developing spatial analysis competence and map analysis competence (Dulamă, 2010c,e).

In this activity as well, the worksheet had a feedforward role (Dulamă & Ilovan, 2016), being designed to prevent errors students might make and to guide them indirectly in identifying or deducing the correct answer (Pahome, 2023b). Also with a feedforward function, the teacher could provide students with a text about the landscapes of the commune, an aspect suggested in our previous studies (Bogdan, 2024, 2025). In this research, it was found that students had difficulties understanding the meaning of degraded forest landscapes and the composition of deciduous forests from different tree species; therefore, the worksheet did not provide all the necessary information and cues for students to correctly solve all items in the post-test.



In this study, we note that the task of analyzing photographs and the landscape map has a high level of difficulty and is challenging for students, as they had not previously analyzed such photographs and maps independently. In this activity, students were placed in their zone of proximal development (Vygotsky, 1962).

### ***Analysis of the learning activity***

In this formative intervention, each student individually analyzed the photographs, the relief map, and the landscape map and completed the tasks in the worksheet. During the completion of the tasks, students did not communicate orally with the teacher and did not request additional information to clarify more difficult aspects. The organization of the teaching activities respected certain rules and conditions specific to multi-grade classrooms, where the teacher monitors less intensively the activity of students working independently (Bogdan, 2024, 2025).

In this learning activity, students developed the general competence “3. Relating the surrounding reality to its cartographic representation,” provided in the Geography curriculum (Ministry of National Education, 2014b, p. 4), as well as the specific competences: “3.2. Using signs and other conventional representations”; “3.1. Identifying the position of elements represented on the map”; “3.3. Correctly reporting the position of elements on cartographic representations”; “3.4. Using simple graphic and cartographic representations” (Ministry of National Education, 2014b, p. 6). In this learning situation, students observed the conventional symbols included in the map legend and identified them in the content of both the landscape map and the relief map. They analyzed the position of areas where certain types of landscapes occur, established relationships between relief levels and landscape types, and between the geographical position of rural settlements and the spatial distribution of landscapes. Students used inductive learning strategies when analyzing photographs and deductive strategies when analyzing maps (Ministry of National Education, 2014b).

Students also developed the general competence “1. Presenting observable reality using general and specific terminology” (Ministry of National Education, 2014, p. 4) and the specific competences: “1.1. Identifying geographical terms in different texts/contexts/learning situations”; “1.3. Using simple geographical terms in familiar contexts” (Ministry of National Education, 2014, p. 5). When analyzing the legend, students encountered landscape names as geographical terms (residential landscape, deciduous forest landscape, coniferous forest landscape, mixed forest landscape, degraded forest landscape, pasture landscape, natural meadow landscape) (Baciu, 2014; Șomîtcă, 2017a,b). Within the landscape map, students analyzed the extent of landscapes and their position relative to others based on colors. To establish the relationship between landscapes and altitude, students analyzed the relief map, and to form visual representations, they analyzed photographs. To analyze these materials correctly and systematically, students were guided by the worksheet tasks related to each landscape, which directed them to follow a certain sequence of observable aspects.

Students also developed the general competence “4. Developing interest in understanding the local environment, the country, and the contemporary world” (Ministry of National Education, 2014, p. 4) and the specific competences: “4.1. Developing curiosity about geographical elements of the local environment, country, and contemporary world”; “4.2. Developing interest in understanding the role of the environment for life and society”; “4.3. Developing interest in understanding natural and human diversity” (Ministry of National Education, 2014, p. 7). The curriculum recommends the use of resources that help students expand knowledge, spatially relate phenomena occurring in the local environment in real time, present observable elements (e.g., landscapes), and develop respect for natural diversity (Ministry of National Education, 2014b, p. 7).

In our previous studies, we emphasized that, in order to ensure understanding of new information represented on maps and the correct solving of tasks, an essential condition is the quantity and quality of prior knowledge stored in students’ long-term memory (Bogdan, 2025). Fourth-grade students living in the Măguri-Răcățâu administrative territorial unit have representations of deciduous forests, coniferous forests, pastures, and meadows. The pre-test and post-test results show that they do not have



representations of mixed forests or degraded forest landscapes, even though they may have observed them in reality.

In this learning activity, we consider that, through the analysis of landscapes within the administrative territorial unit, students began to develop the competence of analyzing thematic maps related to landscapes and the competence of analyzing photographs. With the help of the worksheet, students learned to analyze a landscape and to identify its characteristics both in photographs and using maps. The worksheet guided students toward a “model” or standard (Golu, 2007) for landscape analysis. Students performed an empirical sensory analysis (Zlate, 1999) of landscapes in photographs and a concrete analysis when observing them in the local environment.

Students also performed an abstract-level analysis (Zlate, 1999) when observing the landscape map, as the map is a mathematical representation of reality. They compared the size of areas with different landscapes (e.g., deciduous vs. coniferous forests) and evaluated the altitude at which certain landscapes develop. Students learned to compare landscapes according to logical criteria (Golu, 2007): position relative to altitude, slope, vegetation characteristics, and human organization of space.

In this context, students practiced analysis as a fundamental operation of thinking (Golu, 2007; Zlate, 1999), as a cognitive process (Anderson et al., 2001), and as a scientific research method (Romanian Academy, 2009, 2010; Marcu, 2000). The objectives achieved in this activity fall within the “Analysis” category and the subcategory “Analyzing elements” in Krathwohl’s (2002) taxonomy.

At the end of the study, it can be concluded that both the teacher and the worksheet played an essential role in developing higher levels of competence in landscape analysis, thematic map analysis, and photograph analysis. Through the worksheet tasks, students benefited from guidance, mediation (Vygotsky, 1962), or scaffolding from the teacher in understanding how landscapes form and are distributed in mountainous areas and how they are represented on maps.

### ***Analysis of results and conclusions***

The results of this study highlight a significant improvement in students’ performance following the instructional intervention. Based on the comparison between pre-test and post-test scores, a substantial increase in performance is observed, confirmed both through individual analysis and statistical analysis. This statistically significant difference suggests that the intervention had a positive impact on learning. The very large effect size indicates that this improvement is not random but reflects a substantial change in students’ performance levels. These findings support the conclusions of our previous studies in which the same students analyzed the hydrographic map (Bogdan, 2024) and the relief map (Bogdan, 2025) of the Măguri-Răcățău administrative territorial unit.

A relevant pedagogical aspect is that all students showed progress. The results suggest that the intervention was accessible and effective for all students in the group, regardless of their initial level of spatial analysis competence and geographical knowledge. Moreover, the strong negative correlation between pre-test score and gain indicates that students with lower initial performance benefited the most from the intervention. This finding is particularly valuable, as it highlights the potential of this approach to reduce performance gaps and to support learning especially in multi-grade classroom settings.

From a didactic perspective, the results support the effectiveness of discovery-based learning, using thematic maps, in developing knowledge among primary school students. Students’ active involvement in the learning process, the use of visual resources, and guided exploration of visual information appear to contribute to deeper understanding and more effective consolidation of knowledge about local landscapes.

## **REFERENCES**

- Academia Română (2009). *Dicționar explicativ al limbii române* [Explanatory dictionary of the Romanian language]. Univers Enciclopedic Gold.
- Academia Română, Institutul de Lingvistică (2010). *Micul dicționar academic, ediția a II-a* [The Little Academic Dictionary, 2nd Edition]. Univers Enciclopedic.



- Anderson, L., Krathwohl, R., Airasian, P., Cruikshank, K., Mayer, R., Pintrich, P., Raths, J., & Wittrock, M. (Eds.) (2001). *Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy*. Longman.
- Andrianu, B., & Bulău-Olaru, I. (2025). Identifying the Educational Needs of Children from the Rural Area of Cluj County. *Research and Education*, 13, 39-69. <http://doi.org/10.63467/red.13.2025.art4>
- Antal, M.-I., Ilovan, O.-R., Dulamă, M.E., Ciupe, I.-A., & Voicu, C.-G. (2020b). Selecting Photographs from Web Sources for Online Learning Activities. Working with Representations. In M. Vlada, G. Albeanu, A. Adascalitei & M. Popovici (Eds.), *Proceedings of the 15th International Conference on Virtual Learning (ICVL-2020)*, 111-119.
- Antal, M.I., Dulamă, M.E., & Ilovan, O.-R. (2020a). *Teachers' Opinions on Using Photographs to Study Natural Sciences*. Romanian Review of Geographical Education, 9(1), 21-37. <http://doi.org/10.24193/RRGE120202>
- Antofie, M. M., & Sand Sava, C. (2015). New Skills in Education for Biodiversity Conservation in Romania. *3rd International Engineering and Technology Education Conference & 7th Balkan Region Conference on Engineering and Business Education, Sciendo* (Vol. 1/1, November, pp. 1-9). <http://doi.org/10.1515/cplbu-2015-0038>
- Baciu, N. (2014). *Dinamica și tipologia peisajului: note de curs* [Landscape dynamics and typology: course notes]. Bioflux. [https://editura.bioflux.com.ro/docs/CARTE\\_DINAMICA\\_TIPOLOGIA\\_PEISAJULUI\\_N-BACIU.pdf](https://editura.bioflux.com.ro/docs/CARTE_DINAMICA_TIPOLOGIA_PEISAJULUI_N-BACIU.pdf).
- Bogdan, N. I. (2024). Analysis of Rivers on the Map, in Primary Education. *Romanian Review of Geographical Education*, 13(1-2), 68-80. <http://doi.org/10.23741/RRGE20245>
- Bogdan, N.-I. (2025). Analysis of the relieve on the map in primary education. *Romanian Review of Geographical Education*, 14(1-2), 7-29. <http://doi.org/10.23741/RRGE20252>
- Buzilă, L., Buzilă, S.R., & Ignat, E. (2017). Gymnasium pupils researching the Gersa Valley landscape. *Romanian Review of Geographical Education*, 2, 28-38. <http://doi.org/10.23741/RRGE220173>
- Cîineanu, M. D., Dulama, M. E., Hîrlav, C., & Pop, C. (2023). Developing Analytical Thinking through the Use of Maps in Geography. *Romanian Review of Geographical Education*, 12(1-2), 45-57. <http://doi.org/10.23741/RRGE20234>
- Crețan, R., Chasciar, D., & Dragan, A. (2024). Forests and their related ecosystem services: visitors' perceptions in the urban and peri-urban spaces of Timișoara, Romania. *Forests*, 15(12), 2177. <https://doi.org/10.3390/f15122177>
- Deac, A.S., Ilovan, O.-R., Chiș, O. & Dulamă, M.E. (2019). Primary grades teachers' perceptions of learning activities in nature. In V. Chiș & I. Albulescu (Eds.), *The European Proceedings of Social & Behavioural Sciences EpSBS* (pp. 358-364). <https://doi.org/10.15405/epsbs.2019.06.44>
- Dincă, I., Dărăbăneanu, D., & Oprea, I. M. (2021). Collective and social representations on nature and environment: Social psychology investigation in rural areas. *Land*, 10(12), 1385. <https://doi.org/10.3390/land10121385>
- Doncean, M. (2012). Creativity in forest ecosystems in the mountain-implications in rural tourism development. *Creativitatea în eco-sistemul forestier din zona montană – implicații în dezvoltarea turismului rural. Turismul rural românesc în contextul dezvoltării durabile*, 69-85.
- Dragan, A., Crețan, R., Jucu, I. S., & Oancea, O. A. (2024). Rural landscapes as cultural heritage and identity along a Romanian river. *Heritage*, 7(8), 4354-4373. <https://doi.org/10.3390/heritage7080205>
- Drăguț, L. (2000). *Geografia peisajului*. Presa Universitară Clujeană.
- Drînda, M. (2020). *Valorificarea didactică a drumețiilor în formarea reprezentărilor geografice* [Educational Valorization of Hiking in the Development of Geographical Representations]. Dota.
- Dulamă, M.E. (2005). Educația în mediul rural din perspectiva dezvoltării durabile [Rural education from a sustainable development perspective]. *Eco-Univers pedagogic*, 1, 33-44.
- Dulamă, M.E. (2006). *Harta în predarea geografiei* [The map in the teaching of geography]. Clusium.
- Dulamă, M.E. (2010a). Conceptualizarea în ciclul primar la geografie [Conceptualization in primary school geography]. In V. Chiș & I. Albulescu, *Cercetări și aplicații în științele educației* [Research and applications in educational sciences] (pp. 295-300). Casa Cărții de Știință.



- Dulamă, M.E. (2010b). *Cunoașterea și protecția mediului de către copii. Teorie și aplicații* [Children's Knowledge and Protection of the Environment: Theory and Applications]. Presa Universitară Clujeană.
- Dulamă, M.E. (2010c). *Didactică axată pe competențe* [Didactics focused on competences]. Presa Universitară Clujeană.
- Dulamă, M.E. (2010d). *Formarea competențelor elevilor prin studierea localității de domiciliu. Teorie și aplicații* [Training students' competencies by studying their hometown. Theory and applications]. Presa Universitară Clujeană.
- Dulamă, M.E. (2010e). *Fundamente despre competențe. Teorie și aplicații* [Fundamentals about competences. Theory and applications]. Presa Universitară Clujeană.
- Dulamă, M.E. (2011c). *Geografie și didactica geografiei pentru învățământul primar și preșcolar* [Geography and the Teaching of Geography in Primary and Pre-school Education]. Presa Universitară Clujeană.
- Dulamă, M.E. (2014). The Use of Geographic Thematic Maps in E-Learning. Exemplification: Bobota Village, Romania. In: M. Vlada, G. Albeanu, & D.M. Popovici (Eds.), *Proceeding of the 9<sup>th</sup> International Conference on Virtual Learning* (pp. 52-59). Editura Universității. <http://www.scribd.com/doc/243333879/Proceedings-of-ICVL-2014-ISSN-1844-8933#scribd>
- Dulamă, M.E., & Ilovan, O.-R. (2016). How powerful is feedforward in university education? A case study in Romanian geographical education on increasing learning efficiency. *Educational Sciences: Theory & Practice* (ESTP). *Kuram ve Uygulamada Eğitim Bilimleri*, 16(3), 827-848. <http://doi.org/10.12738/estp.2016.3.0392>
- Dulamă, M.E., Ilovan, O.-R., & Magdaș, I. (2017). The forests of Romania in scientific literature and in geography. Teachers' perceptions and actions. *Environmental Engineering and Management Journal*, 16(1), 169-186.
- Dulamă, M.E., Ilovan, O.-R., Magdaș, I., & Răcășan, B. (2016). Is there any forestry education in Romania? Geography teachers' perceptions, attitudes, and recommendations. *Studia Universitas Babeș-Bolyai, Psychologia-Paedagogia*, LXI(1), 27-52.
- Dumitras, A. F., Pop-Boanca, P., Damian, A., Bors-Oprisa, S., Clapa, D., Singureanu, V., ... & Sabo, G. (2010). Life quality improvement in Romania's cities by transformation of vicinity forests in forest-parks with minimum interventions upon the natural environment. In *XXVIII International Horticultural Congress on Science and Horticulture for People (IHC2010): International Symposium on 937* (pp. 1081-1088).
- Golu, M. (2007). *Fundamentele psihologiei, vol I, ediția a V-a* [Fundamentals of Psychology, Vol I, 5th Edition]. Editura Fundației România de Mâine.
- Havadi-Nagy, K. X., & Ilovan, O. R. (2013). Educational programs in the national parks of Romania focus on competences. In *Educația pentru dezvoltare durabilă: inovație, competitivitate, eficiență* [Education for sustainable development: innovation, competitiveness, efficiency] (pp. 636-642).
- Ilieș, D. C., Baias, S., Buhaș, R., Ilieș, A., Herman, G. V., Gaceu, O., ... & Măduța, F. (2017). Environmental education in protected areas. Case study from Bihor County, Romania. *GeoJournal of Tourism and Geosites*, 19(1), 126-132.
- Ilovan, O.-R., Dulamă, M.E., Boțan, C.N., Havadi-Nagy, K.X., Horvath, C., Nițoaia, A., Nicula, S., & Rus, G.-M. (2018). Environmental education and education for sustainable development in Romania. Teachers' perceptions and recommendations. *Journal of Environmental Protection and Ecology*, 19(1), 350-356.
- Isopescu, D. N., Diaconu, C. M., & Baci, I. R. (2019). Implementation of Outdoor Education in Romanian Educational System. In *EDULEARN19 Proceedings* (pp. 3545-3552). IATED.
- Krathwohl, D.R. (2002). A Revision Bloom's Taxonomy: An Overview. *Theory into Practice*, 41(4), 212-218.
- Loos, J., Abson, D. J., Dorresteijn I., Hanspach J., Hartel T., Horcea-Milcu A. I., Mikulcak F., & Fischer, J. (2016). *Sustainable landscapes in central Romania. A social-ecological study on the future of southern Transylvania*. Pensoft.



- Magdaş, I. (2018). *Prezentarea și prelucrarea datelor cercetării în științele educației. Ghid pentru studenți* [Presentation and processing of research data in educational sciences. Student guide]. Presa Universitară Clujeană.
- Marcu, F. (2000). *Marele dicționar de neologisme* [The Great Dictionary of Neologisms]. Saeculum.
- Mateoc-Sîrb, N., Toth, A., Mateoc, T., Mănescu, C., & Dumitrescu, C. (2016). Aspects regarding rural space development and life quality improvement in Romania. *International Multidisciplinary Scientific GeoConference: SGEM*, 3, 43-50.
- Ministerul Educației Naționale (2014). *Anexa nr. 2 la ordinul ministrului educației naționale nr. 5003 / 02.12.2014 Programa școlară pentru disciplina GEOGRAFIE Clasa a IV-a* [Annex No. 2 to the order of the Minister of National Education No. 5003 / 02.12.2014 School curriculum for the subject GEOGRAPHY Grade 4]. București.
- Pahome, D. (2022). How can Representations be Changed Using Didactic Methods and Techniques? *Pro Edu. International Journal of Educational Sciences*, 7(4), 63-74.
- Pahome, D. (2023a). *Formarea reprezentărilor în învățământul primar, la științe* [The formation of representations in primary education, in science]. Presa Universitară Clujeană.
- Pahome, D. (2023b). Observation sheet – an essential tool for facilitating learning. *Romanian Review of Geographical Education*, 12(1), 5-16. <http://doi.org/10.23741/RRGE20231>
- Pahome, D. (2023c). *Pădurea de foioase din România. Activități de învățare pentru copii* [Deciduous forest in Romania. Learning activities for children]. Presa Universitară Clujeană.
- Pintilii, R. D. (2022). Forest recreation and landscape protection. *Forests*, 13(9), 1440. <https://doi.org/10.3390/books978-3-0365-6494-4>
- Pirvu, R., & Țenea, L. (2021). Health, education and culture in rural areas of Romania. Regional analysis. *Annals of the „Constantin Brâncuși” University of Târgu Jiu, Economy Series*, 4, 165-175.
- Pleșa (Vidrean), M. (2012). *Valorificarea elementelor locale în lecțiile de Geografie și de Cunoașterea mediului în ciclul primar* [Capitalizing on local elements in Geography and Environmental Studies lessons in primary school]. *Lucrare metodico-științifică pentru obținerea gradului didactic I* [Methodological-scientific work for obtaining the teaching degree I]. Universitatea „Babeș-Bolyai”, Cluj-Napoca.
- Popa, A.R., Ilovan, O.-R., & Dulamă, M.E. (2017). Capitolul 9. Analizarea disfuncționalităților teritoriale din comuna Galda de Jos, județul Alba [Chapter 9. Analyzing territorial dysfunctions in Galda de Jos commune, Alba county]. In M.E. Dulamă (Ed.), *Cercetări în didactica geografiei* [Research in geography teaching] (pp. 78-91). Presa Universitară Clujeană.
- Popescu, A.C. (2010). Formarea competențelor de percepție și interpretare a unui peisaj geografic [Developing skills in perception and interpretation of a geographical landscape]. *Romanian Journal of Education*, 1(3-4), 9-20.
- Roba (Iancu), C.L. (2019). *Valorificarea potențialului geografic local la elevii din clasa I în activități de cunoașterea mediului* [Capitalizing on the local geographical potential of first grade students in environmental knowledge activities]. *Lucrare metodico-științifică pentru obținerea gradului didactic I* [Methodological-scientific work for obtaining the teaching degree I]. Universitatea „Babeș-Bolyai”, Cluj-Napoca.
- Rus, G.-M., Dulamă, M.E., Ursu, C.-D., Colcer, A.-M., Ilovan, O.-R., Jucu, I.S., & Horvath, C. (2019). Online Apps, Web Sources and Electronic Devices: Learning through Discovery about Valea Ierii [Iara Valley]. In M. Vlada (Ed.), *Proceeding of the 14th International Conference on Virtual Learning* (pp.110-119). Editura Universității.
- Rus, G.-M., Ilovan, O.-R., Dulamă, M.E., Chiș, O., Ursu, C.-D., Colcer, A.-M., & Horvath, C. (2020). The Anthropic Impact on Relief and Vegetation. Case Study: Valea Ierii. In V. Chiș (Ed.), *7<sup>th</sup> Edition of Education Reflection Development International Conference 2019, European Proceedings of Social and Behavioural Sciences* (Vol. 85, 768-778). <http://doi.org/10.15405/epsbs.2020.06.80>
- Soica, H. (2020). Imagini șocante cu pădurea de la Măguri Răcătău! Pădurarii spun că i-a rupt vântul, dar un fost coleg îi contrazice – VIDEO [Shocking images of the forest in Măguri-Răcătău! The foresters say the wind brought it down, but a former colleague contradicts them]. *Știri de Cluj*.



<https://www.stiridecluj.ro/social/imagini-socante-cu-padurea-de-la-maguri-racatau-padurarii-spun-ca-i-a-rupt-vantul-dar-un-fost-coleg-ii-contrazice-video>

- Șomîtcă, A.M. (2017a). *Observarea peisajului montan* [Observing the mountain landscape]. Dota.
- Șomîtcă, A.M., (2017b). Studiul peisajului montan și a unor disfuncționalități în acest peisaj [Study of the mountain landscape and some dysfunctions in this landscape], în M.E. Dulamă et al. (Eds.), *Tendințe actuale în predarea și învățarea geografiei/ Contemporary trends in teaching and learning geography*. Presa Universitară Clujeană.
- Tomulețiu, A.E., & Moraru, A. (2010). Rural education in Romania: Present and perspectives. *Procedia-Social and Behavioral Sciences*, 2(2), 402-406. <https://doi.org/10.1016/j.sbspro.2010.03.034>
- Tudoran, G.M., Cicșa, A., Cicșa, M., & Dobre, A.C. (2022). Management of recreational forests in the Romanian Carpathians. *Forests*, 13(9), 1369. <https://doi.org/10.3390/f13091369>
- Turșan, V.G. Dulamă, M.E., & Kosinszki, S.-A. (2016). Capitalising rural identity in Mărișelu village, Bistrița-Năsăud county? First step: education for equestrian and horse-drawn carriage tourism. *Romanian Review of Geographical Education*, 5(2), 66-79. <http://doi.org/10.23741/RRGE220165>
- Vereș, S., Ilie, A. S., & Buda, P.M. (2024). Use of Films, Platforms, and Educational Applications in Primary Education. *Romanian Review of Geographical Education*, 13(1-2), 46-67. <http://doi.org/10.23741/RRGE20244>
- Vidrean, M. (2020). *Valorificarea elementelor locale în cunoașterea mediului de către elevi* [Capitalizing on local elements in students' environmental knowledge]. Dota.
- Vijulie, I., Preda, M., Nita, A., & Tudoricu, A. (2024). Opportunities to Capitalize on Transylvanian Wood Pastures through Nature-Based Tourism: A Case Study of Viscri Village, Brașov County, Romania. *Forests*, 15(4), 704. <https://doi.org/10.3390/f15040704>
- Vygotsky, L. (1962). *Thought and language*. MIT Press.
- Zlate, M. (1999). *Psihologia mecanismelor cognitive* [Psychology of cognitive mechanisms]. Polirom.