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FORMING THE COMPETENCES TO ANALYSE AND INTERPRET PHOTOGRAPHS

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Abstract

This research started from the following premises. The Internet network is an exceptional source of photographs which can be used to enable pupils' and university students' forming of representations. Photographs are used very much for achieving and assessing knowledge, but professors, teachers and students have difficulties in decoding their contents. Forming the competences to analyse and interpret photographs with geography contents takes a lot of time. This is true both for researchers who train in working with images and for teachers and professors who train themselves and their students. In order to form the competences of the students who study to be teachers, they were involved into learning activities where they analysed and interpreted photographs. To assess the level of these competences, within their didactic portfolio, students received the task to choose a photograph (e.g., a landscape, a geographical process, a geographical system) and to phrase, starting from it, five questions that focused on contents analysis and five questions that focused on interpretation or explanation. We analysed our students' questions and answers, we identified mistakes and assessed their competence level. We remarked students' competence in choosing appropriate photographs, as well as their confusing or non-differentiating between the analysis questions and the interpretation ones, together with phrasing certain questions less appropriate to the analysis process and to explaining the photographed aspects.

Keywords: University education, Geography, learning activity, task, landscape, assessment grid

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1. Introduction

The Internet network is an exceptionally rich source of photographs. It can be used to enable pupils' and university students' forming of representations. They have easy access and may study various photographs in order to support the learning process at Natural Sciences (Antal et al., 2020). In the didactic activity, photographs were used frequently for noticing certain environmental components, for illustrating or explaining geographic phenomena or processes (Dulamă & Roşcovan, 2007). When students analyse a photograph that includes environmental aspects, they should be able to identify environmental components, their position in space, their distribution and their limits and features, to discover cause-effect type relations, the spatial land dynamic ones and other relationships among components and to explain them (Dulamă, 2010; Dulamă & Roşcovan, 2007; Magdaș et al., 2018).

A student who has the competences to analyse and interpret photographs, when he or she needs the respective competences, he or she mobilizes an assembly of declarative knowledge, of procedural knowledge, and of attitudinal knowledge (Dulamă & Roşcovan, 2007). Dulamă (2010) differentiates the competence to analyse a photograph from the competence to interpret one and for both competences she details the assemblies of integrated knowledge (2010). Dulamă and Roşcovan (2007) presents a learning situation where the competence to analyse and interpret a photograph is formed and developed, and Dulamă (2010) details two situations of integration for forming the competence: one for analysing the photograph and one for interpreting it. These situations represent good practice examples of using photographs during didactic activities.

In Romania, researchers realised a series of studies referring to assessing the competence level of elaborating topographic profiles (Osaci-Costache et al., 2013a), column charts (Osaci-Costache et al., 2013b), touristic plans (Osaci-Costache et al., 2013), proposals of spatial planning measures for hydrographical basins (Dulamă, Ilovan & Niţoaia, 2016), graphical organisers (Koszinski et al., 2018), of analysing cultural landscapes (Dulamă, Vana & Ilovan, 2016), also during geography university studies (Ilovan et al., 2018), and of representing urban space (Dulamă et al., 2020). Although photographs were used in many studies, we did not find in the scientific literature an assessment grid for the competences to analyse and interpret photographs.

2. Problem Statement

In the lessons realised by teachers for the primary grades, for the secondary school and for high school, as well as in psycho-pedagogical training graduation theses aiming to certify their competences as teachers, we noticed that teachers and students had certain difficulties in choosing the most appropriate photographs on the researched topic and in valorising the contents of these photographs for an educational aim. Alenizi (2015) noticed also certain difficulties that teachers faced during an efficient use of photographs. Popescu (2010) pointed out that many students needed some time to adapt to space when they faced the reality of the field, not knowing what they had to identify in the landscape and which procedure to employ in order to solve the task. Although during university programmes, students got involved at several disciplines into learning activities where photographs were used, especially for illustration purposes or they themselves included in their projects own photographs or realised by others, they had difficulties in

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deciphering their contents and in using these visual materials as teachers that guided and enabled students decode the photographed geographical aspects.

3. Research Questions

In this research, we search for answers to the following questions: What photographs do students choose from the Internet network in order to solve a task? In what categories fall the photographs chosen by the students in order to solve the task from their didactic portfolios? Which are their mistakes when choosing photographs? What aspects do they propose for analyses through the questions posed? What aspects do they propose for interpretation through the questions posed? What are their mistakes when phrasing questions?

4. Purpose of the Study

The purpose of this research is to analyse photographs selected by university students in order to solve a task of their didactic portfolio and the questions they phrased from a teacher's perspective, who guides his or her pupils' process of discovering the visually represented content.

5. Research Methods

***Procedure*.** Part of their electronic didactic portfolio realised during the first semester, in Autumn of 2019, at the discipline "Computer-assisted Training", students received the task to choose a photograph (e.g., a landscape, a geographical process, a geographical system) and, based on it, to phrase five questions that focused on analysing the contents of the photograph and five questions aiming at interpretation or explanation.

***Participants*.** In this research, participated 57 3rd year university students, from various specialisations (26 – Geography of Tourism; 18 – Geography; 7 – Cartography; 4 – Territorial Planning; 2 – Hydrology-Meteorology) within the Faculty of Geography, Babeș-Bolyai University, in Cluj-Napoca, Romania, and who were enrolled, besides their programme of specialisation in Geography, in the study programme required in order to obtain the necessary competences for a teaching career.

The research material is represented by 52 photographs chosen by students, and by the analysis and interpretation questions they phrased based on photographs.

***Data collecting and processing*.** Students sent their portfolios by email. We took out the included photographs and students' solution to the photographs-based task. We analysed photographs using visual methods, and questions underwent thematic and contents analysis. We also used tables specific to Education Sciences (Magdaș, 2018) to represent the collected data.

6. Findings

Categories of photographs chosen by students

As we did not ask students to mention the place represented in a photograph, only a part of them mentioned that aspect. From the analysis of the photographed places, 25 were from Romania and 27 were

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from other countries. We underline that for realising this assessment, the professor or the researcher needs in-depth knowledge of the Geography of Romania, he or she needs to be passionate about photographs, or to have travelled in many places within the national territory. In Table 1, one may notice the diversity of the contents of the photographs selected by students. We categorised the photographs from other countries into three categories, and the ones from Romania, into eight categories. We noticed students' preference for mountainous landscapes where there were lakes and rivers. Their percentage was of 34%. In 27 photographs, there were mountains (different types of mountainous landscapes). Only in four photographs were represented landscapes during wintertime. Students preferred photographs of some natural landscapes and selected few photographs of anthropic landscapes (five photographs). In three photographs, there were represented spectacular natural processes from Romania (e.g., the tornado from Făcăeni, a landslide, floods). We noticed students' preference for "beautiful" landscapes. Only in four photographs there were represented degraded landscapes, affected by industrial pollution (two), waste accumulation on a beach, and deforestation.

Table 1. Contents of the students' choice of photographs

Other countries than Romania			**Romania**		
Category of landscapes	**Landscape type**	**No. of photographs**	**Category of landscapes, process**	**Landscape type**	**No. of photographs**
Natural landscapes	Savana	1	Natural processes	Tornado in Făcăeni	1
	Desert	1		Landslide	1
	Volcano	1		Floods	1
	Volcanic eruption	1	Degraded landscapes	Deforestation	1
	Bears in their living environment	1	Vegetal associations	Forest steppe	1
	Confluence of rivers in field area	1		Deciduous forest	2
	Volcanic island with palm trees	1		Coniferous forest	2
	Mountains with a glacial lake	8	Mountain landscapes	During winter	3
	Mountains with a river	3		Mountains with a glacial lake	7
	Mountains – winter	1		Interfluve/crest	1
Degraded landscapes	Pollution on the seaside	1		Petrographic relief	1
	Industrial pollution	2	Hill landscape	Hill and lake	1
Urban landscapes	Monaco – seaport	1	Lacustrine landscape	LakeVidraru	1
	Moscow – Saint Vasile Cathedral	1		Lake Saint Ana	1
	Tokyo	1	Littoral landforms	Quay	1
Total		**25**	Anthropic landforms	Park – Table of silence (Târgu Jiu)	1
				Scattered village	1
			Total		**27**

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6.1. Mistakes in choosing photographs

To diminish the risk of choosing the wrong photographs, we recommended students choose a photograph with a landscape, a geographical process, or a geographical system. We noticed that a student did not include the photograph into his portfolio, two students included schematic drawings (the continents, floating ice with animals), one student chose a processed photograph of planet Earth which did not represent reality, and a student chose a photograph with a bear's den.

6.2. Aspects proposed for analysis by means of students' questions

By means of the phrased questions, we wanted students to notice, to analyse and propose for analysis to possible pupils the elements of the visible subsystem, namely the objects (abiotic elements, built elements, vegetation, forms of anthropic use) and the elements (forms, aspects, light, angles, distances, etc.) visible in the photograph (Baciu, 2014). They had to analyse the objects that could be stable, cyclic (changing according to seasons), and random (for instance, unusual/new meteorological phenomena for a certain place) (Baciu, 2014). In the analysis model of the visible aspects of a landscape, proposed by Drăguţ (2000), there is one stage of inventorying the objects that compose a certain landscape and a stage where they study their combinations (Baciu, 2014).

In this research, we wanted to identify the main aspects in photographs, which students paid the most attention to. We were interested in students' exercising a mental or real analysis operation of decomposing the "photographed" whole into its components, examining and identifying components, identifying their properties, and establishing relations among these (Dulamă, 2010). Because the task was limited to the phrasing of five questions, the present analysis is also limited. Even though in most of the photographs there were landscapes, our research aims at phrasing questions from an analytical perspective, not from that of the theories referring to landscapes and their analysis.

Based on each phrased question, we established a series of categories (Table 2). Some categories targeted natural components (landforms, lithology, climate and weather, vegetation, fauna, soils), while other categories focused on anthropic components (forms of anthropic use, built anthropic elements). From the analysis of the questions grouped on categories, we noticed the highest percentage (84%) of the questions referring to natural components, in comparison to the ones that referred to the analysis of anthropic components (16%). Students' choice might have been influenced by the nature of their specialisation, the highest number of students being enrolled in the study programme of Geography of Tourism (almost 50%). Their preference for choosing photographs with mountain landscapes was followed by their orientation in phrasing questions about landforms: identifying landforms (21.16%), describing landforms (10.38%). Choosing mountain landscapes where hydrographical units were visible was followed by phrasing questions about these: identifying hydrographical units (9.62%) and describing hydrographical units (10.00%). One may also notice the high percentage (over 65%) of questions (174 of these) that focused on identifying components in comparison with questions on describing objects and components.

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Table 2. Components of a landscape targeted through students' analysis questions

Category of elements	Aspects targeted through questions	Questions	
		No.	%
Landforms	Identifying landforms	55	21.16
	Describing landforms	27	10.38
Lithology	Identifying rocks	5	1.92
Climate and weather	Identifying features	20	7.69
Hydrological network	Identifying hydrographical units	25	9.62
	Describing hydrographical units	26	10.00
Vegetation	Identifying plant species	14	5.38
	Identifying vegetation associations	18	6.93
	Describing vegetation associations	13	5.00
Fauna	Identifying animal species	13	5.00
Soils	Identifying soil types	0	0.00
Forms of anthropic use	Identifying forms of anthropic use	14	5.38
	Describing forms of anthropic use	15	5.77
Built anthropic elements	Identifying built anthropic elements	10	3.85
	Describing built anthropic elements	5	1.92
Total		**260**	**100.00**

6.3. Mistakes in phrasing analysis questions

We put the mistaken phrasings of questions into two categories (Table 3): questions phrased in a mistaken or inappropriate/inefficient manner from a didactical point of view (12 questions); questions that required evoking students' previous knowledge and to which one could not answer only by analysing the photograph. In the category of mistakes in phrasing, we included imperative phrasing ("Analyse the landforms in the image!"), questions that required affirmative or negative answers (Yes/No), double questions ("What is the name and the altitude of the highest peak within this mountain range?"), and vague/general questions ("What does the photograph represent?"), whose answer could not be phrased in a precise, clear manner. We considered inefficient for learning the question that asked for counting elements ("How many landform types are there in the image"?).

The phrasings that fell in the second category were either wrong or inadequate for guiding observation and deciphering the contents of the photographs by possible pupils because answers could not be given only by looking attentively at the photographs, but required either previous knowledge (declarative statements, exact data such as numbers, concepts, typologies), or consulting other sources (maps, texts).

Table 3. Mistakes and inadequate phrasing of questions

Category of mistakes	Mistakes	Examples	No. of cases
Concerning the phrasing	Phrasing the task in an imperative manner, not as a question	Describe the landscape in the image! Analyse the landscape types in the image! Identify the landforms in the image!	4
	Questions that require an affirmative or negative answer (Yes/No)	Are there any vegetation elements present in the image?	2

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	Double questions	What are the temperature data and what climate type is this? What is the name and altitude of the highest peak of this mountain range?	2
	Vague/general questions	What can you notice at the landscape in the image? What does the photograph represent?	2
	Questions that require counting elements	How many types of landforms are there in the image?	1
Questions require evoking previous knowledge or using certain resources	Questions that require evoking declarative statements	During which orogenesis did the mountainous unit in the image form? What kind of food do bears eat? Where do brown bears live?	2
	Questions that require evoking exact data (numbers)	Which is the rainfall mean value in the area? Which is the yearly mean temperature for the alpine plateau of the Bucegi Mountains? How many km does Transfăgărăşanul road have? How many inhabitants does the city of Tokyo have? Which is the (maximum) surface of Sahara Desert?	5
	Questions that require knowing geographical names and how to use maps	What is the name of the river that crosses the park? What group of the Carpathians do these mountains belong to? Which are the mountains of Sahara? What group of the Carpathians does the massif in the image belong to? On the territory of which counties does Bucegi Massif extend? Where are the mountainous areas of the Sahara Desert located?	6
	Questions that require including objects into a typology or evoking typologies	What type of landforms do you notice in the image? What type of vegetation do you notice in the image? What genetic type of lake do you notice in the image? What type of valley do you notice in the image? What type of country is Japan from an economic point of view? What kind of landscape is there in the image? What type of city from an economic point of view is there in the image? What type of climate can you identify? What type of rocks are present in the image? What type of animals can be identified in such an ecosystem?	11
	Questions that require evoking concepts	What is the name of the areas around a river? What is the name of a river flowing into another one? What is the name of the place where two rivers meet? What is the name of the river part through which the river flows into another river or into a sea? What is the name of the place where a river starts to flow from?	5

6.4. Aspects proposed for interpretation by means of the phrased questions

After identifying components and their attributes, in the stage of analysing the contents of the photograph, through interpretation questions, the pupil is enabled to deduce the significance of the

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previously discovered aspects. In case of the photographs where there are instances of the geographic reality, the interpretation process in fact consists of explaining the features of elements, of various types (spatial, temporal, dynamic, cause-effect, etc.) of relations identified among the components of the assemblies, of the spreading of objects and phenomena across the terrestrial space, of contrasts, of thresholds or of limits, of developing processes, of causes, conditions, and effects (Dulamă & Roșcovan, 2007; Dulamă, 2010).

In Table 4, we present the main categories where we introduced the students' questions. We excluded 60 questions out of the total of 260, because those did not observe the requested task (they were analysis questions, they referred to aspects unrelated directly to the photograph) or, in their phrasing, we could identify mistakes similar to those identified for the analysis questions. During seminar discussions, we underlined the relevance of questions referring to causes and consequences, which explained then the high number of students' questions about causes (36.5%) and about consequences (12%). Many questions (12.50) targeted aspects concerning the prevention of some processes and phenomena, environmental protection, identifying measures and solutions in various cases and problems. We noticed that students phrased many questions relevant for the explanation methods. Those referred to presenting the development of certain processes, the conditions under which they took place, the involved elements, besides causes and consequences. Many questions aimed at explaining relations among elements, the role or the functions of some environmental components, the capitalization and importance of certain elements. We appreciated the variety of students' questions and the fact that some students correlated the analysis questions with the interpretation ones (Table 5).

Table 4. Aspects targeted through students' interpretation questions

Aspects targeted through questions	**Questions**	
	No.	**%**
Causes of some processes	73	36.50
Prevention, protection, solutions	25	12.50
Consequences/effects/influences	24	12.00
Stages of some processes	15	7.50
Role, functions	15	7.50
Advantages and disadvantages	14	7.00
Risks and threats	14	7.00
Capitalization, importance	13	6.50
Conditions	7	3.50
Total	**200**	**100.00**

Table 5. The photograph chosen by a student and the phrased questions

	Analysis questions	**Interpretation questions**
	1. What landscape is represented in the photograph? (... a beach.) 2. What colour is the sand of the beach? (The sand is black.) 3. What vegetation is there at the at the margins of the beach?	1. Why do you say that this is a beach? (... because it is slightly inclined, and sand is present.) 2. Why do you think the sand is black? (... because it is a volcanic isle.) 3. What climatic zone does the photograph represent? (... the warm/tropical zone.)

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	(... palm trees, but also other species.)	
	4. What animals do you see in the image? (... two turtles.)	4. What could be the reason for turtles to get out to the sand? (Because they bury their eggs into the sand and keep them there until their little ones get out.)
	5. How is the weather? (... it is good, it seems pleasant.)	5. Why do you consider that the weather is good? (Because even if there are clouds in the sky, these are white and do not show bad weather.)

7. Conclusion

To sum up, we remark the thematic diversity, the beauty and complexity of the represented systems in the photographs chosen by the students in Geography, and the quality of the photographs, which point out their competence in choosing appropriate photographs. Mountain landscapes with glacial lakes and rivers represented the main illustrated topic by those photographs, probably due to students' specialisation in tourism and due either to their native or educated aesthetic sense. Although the number of phrased questions was small, each student aimed with them to identify certain components of the environment from several geospheres, concluding with a comprehensive analysis. Concerning the interpretation questions, most of the questions focused on causes and consequences, as well as on aspects of environmental protection. The weaknesses of students' phrasing questions were their confusing or non-differentiating between the analysis questions and the interpretation ones, together with phrasing certain questions less appropriate to the analysis process and to explaining the photographed aspects.

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