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DEVELOPING STUDENTS' COMPETENCE TO ANALYSE LANDSCAPES DURING GEOGRAPHY UNIVERSITY STUDIES

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Abstract

The focus on developing students' competences underlines the importance of creating learning situations that enable students improve their knowledge and skills. Assessment is a crucial stage in giving feedback on students' performance. In the context of an increasing number of studies on developing and assessing university students' competences, we present a good practice example from the Faculty of Geography of Babeș-Bolyai University, Cluj-Napoca, Romania. The topic of analysing landscapes is both challenging and rewarding for students due to the complexity of the knowledge and skills it involves. Our study on a series of students' projects (on both urban and rural landscapes) assesses these students' competence level, while proposing improvement measures. We took into account professors' requests (about editing, the quality of the theoretical background, the criteria related to the quality of explanation and argumentation, correctness of results, originality, value of the applicative part, observing the structure and contents of the project, etc.) and a series of specific criteria for landscape research. For the latter, we analysed and assessed the following for the students' projects: cartographic and photographic materials on landscapes and explanations associated to these, identified vulnerabilities and imbalances of the landscapes in the research areas, proposals for landscape reconstruction and their spatial and functional re-integration.

Keywords: Regional Geography, cultural landscapes, assessment tool.

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1. Introduction

Assessment is a crucial stage in giving feedback on students' performance. In the context of an increasing number of studies on developing and the assessment of university students' competences in Romania (Dulamă, Ilovan, & Buş, 2016a, Dulamă, Vana, & Ilovan, 2016b, Dulamă, Ilovan, & Magdaş, 2017a; Dulamă et al.,2017b; Ilovan et al., 2017), we present a good practice example from the Faculty of Geography of Babeş-Bolyai University, Cluj-Napoca, Romania.

The topic of analysing landscapes is both challenging and rewarding for students due to the complexity of the knowledge and skills it involves (Duncan & Duncan, 2010; Kim, 2016; Rose, 2012; Stan, 2010; Tyner, Kimsroy, & Sirik, 2015). Our study on a series of students' projects (on both urban and rural landscapes) assesses these students' competence level, while proposing improvement measures.

A geographic landscape is "a spatial structure with a configuration of its own, individualized due to the interaction between abiotic, biotic and man-made factors" (Drăguţ, 2000; Baciu, 2014, p. 19). Landscape's structure is relatively homogenous, both structurally and functionally. Each geographic landscape is "the visible expression of the geographic environment" (Baciu, 2014, p. 19) and one can capture it with one glance. Geographic landscapes have a high degree of complexity and a dynamic which determines their differentiation in time and space. It is a part of the Earth's surface, "a spatial structure", easily observable, which forms a relatively homogenous structural and functional ensemble, with a certain specificity, due to the combination of living (plants, animals), non-living (topography) and man-made components (human activity and its results).

A thorough knowledge of landscapes, of their classification and dynamic is demanded of geographers, Geography teachers, but also of other professions that tackle land usage, for a proper use of the respective landscapes. The ability to analyse them and propose reconstruction measures for degraded ones is formed through learning activities held at all the specialisations of the Faculty of Geography

2. Problem Statement

The research is based on the observation that Geography university students have certain gaps and difficulties when it comes to investigating the geographic landscapes of a certain area

3. Research Questions

We intend to answer the following questions: What is the Geography students' competence level when analysing landscapes? What difficulties did they have? What are the necessary measures for overcoming difficulties and increasing their competence level?

4. Purpose of the Study

Our study aims to establish the students' competence level when analysing landscapes in an urban or rural area and set landscape reconstruction measures, to identify the difficulties encountered in their studies and propose measures to overcome them.

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5. Research Methods

The research consists of six analyses of geographic landscapes, authored by Geography students in 2016, as projects for the course on the *Geography of Landscape*. Two studies refer to landscapes from the communes of Șuncuiuș (Bihor County) and Urmeniș (Bistrița-Năsăud County). Four other studies emphasised landscapes from Cluj-Napoca (Cluj County), Târgu-Lăpuș and Baia Mare (Maramureș County), Mioveni (Argeș County), and the commune of Tăuţii-Măgherăuș (Maramureș County). We analysed the texts, photographs and maps included in these studies.

Research participants are six Geography students, enrolled in the Faculty of Geography, Babeș-Bolyai University, creators of the respective case studies. They accepted to submit them to this research.

Methods. From a geographic standpoint, the research conducted by the students is case studies where they analysed the landscapes from a chosen area. We gathered the information regarding the manner in which field research had been conducted and the difficulties encountered on the ground, through the participative observation method. We employed the document analysis method, the students projects being documents meant for review at the end of a university course. The text of these studies underwent content analysis. We analysed and interpreted the photographs and maps with the help of visual methods.

Research tools. We devised an assessment tool (Table 1) to evaluate the students'competence level to analyse landscapes and set reconstruction measures (there was no such tool in the reviewed literature). It has 14 criteria, different from the ones employed in the assessment held in the course on the Geography of Landscape. For each criterion, scores from 1 to 5 were given. There is a minimum of 14 points and a maximum of 70 points for each study. For each project, we added the scores and divided the sum to the number of criteria. Based on the average, we identified three competence levels: average of 1-2 – low competence level, average of 2.1-4.5 – medium, and average of 4.5-5 – high.

Table 01. Assessment tool used to establish university students' competence level to analyse geographic landscapes and to establish landscape reconstruction measures

Assessed aspects	Criteria	Settlements (scores from 1 to 5)					
		A*	B	C	D	E	F
Presenting landscapes in text	C1. Percentage / number of identified landscapes						
	C2. Including landscapes in typologies						
	C3. Location and extension of landscapes						
	C4. Highlighting the aesthetic value of landscapes						
	C5. Presentation of landscape dysfunctionality						
	C6. Measures for landscape reconstruction						
	C7. Highlighting features and specificity						
	C8. Analysis depth (details)						
	C9. Analysing the dynamics and landscape functionality						
	C10. Analysing the landscape structure and components						
Representing landscapes in photos	C11. Capturing the landscape homogeneity						
	C12. Percentage of landscapes captured in photos						
Representing landscapes on maps	C13. Organising basic landscape units in the legend						
	C14. Localising basic landscape units						
Average							

* A –Șuncuiuș; B –Urmeniș; C – Cluj-Napoca; D – Târgu-Lăpuș; E – Baia Mare and Tăuţii-Măgherăuș; F –Mioveni

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6. Findings

6.1. Analysis of the task given to students

At the start of the activity, in order to increase the chances of success, the professor discussed the following with the students: the objectives to be attained by studying these landscapes and devising the case studies; the proposed content units to be developed in their paper; editing requirements; assessment criteria; percentage of the final grade.

Objectives: (a) appropriating the operational basis needed to identify and analyse landscape structure and dynamics and to make an aesthetic and functional assessment of geographic landscapes; (b) using GIS to reduce dysfunctions and critical states that affect the landscape structure and dynamics; (c) devising development strategies; (d) forming communication skills for the acquired knowledge.

Students were required that the projects had five content units, including conclusions and references. They were also required to include the following maps (mandatory): hypsometry, land use, basic landscape units, and landscape value. *Content units.* I. Structure and characteristics of geographic landscapes; II. Landscape typology (types and subtypes); III. Landscape vulnerabilities and imbalances; IV. Landscape reconstruction and spatial-functional reintegration; V. Conclusions; References. *Editing requirements:* number of pages: min. 6 / max. 10; maps/graphs/tables inserted in text; editing: TNR 12, 1 spacing: A4; margins: left - 3.0 cm; up, down, right - 2.0 cm. The use of diverse references was demanded. *Assessment criteria:* quality of explanations and arguments; correctness of results; originality; application value; abiding the given structure and content; highlighting own results. Percentage from final grade: 40% (20% - presentation: PowerPoint; 20% - written part: editing in .doc, .docx or .pdf formats).

6.2. Work analysis

Structure and content unit analysis. All papers had the required structure and included an *Introduction* as well, where they presented the meaning of the concept of landscape, and the motivation behind their research and choice of area.

In Chapter I. Structure and characteristics of the geographic landscape, the students presented the location and limits of the study area, information regarding the main structuring factors of the landscape (topography, climate) and secondary factors (human, hydrology, soils, vegetation, fauna and fires), mentioned in the references (Baciu, 2014). They mentioned certain general characteristics of factors and some details referring to the elements of the visible subsystem (abiotic, vegetation, built elements, etc.) (Baciu, 2014) and the relations among them. The analysis of these factors is backed by the representation of some factors on the hypsometric and land use maps (built areas, agricultural areas and forests).

In chapter II. Landscape typology, students brought attention to the difficulty of classifying the landscapes from the study area because of researchers' subjectivity and frequent landscape changes. The geographic literature contains several landscape classifications, based on different criteria (orography, structure, administrative, geomorphological, bio-soil-climate, cultural-historical, social-economic, state and dynamic, etc.) (Baciu, 2014). Basing their research on the different and few references found in Romanian literature, they classified the landscapes according to: habitat type; functionality; territorial relations among landscapes, etc. The number and diversity of identified landscape were higher in the studies regarding large urban areas (Cluj-Napoca and Baia Mare) and lower for communes (Urmeniș).

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Many landscape subtypes were identified as urban (historical centre, suburban, local square, recreational, educational, medical, retail, green areas and parks), industrial (industrial waste, settling basins, quarries, mine shafts, industrial platforms), agricultural (wine area, orchards, grazing areas, pastures), forests.

Basic landscape units were identified based on their topographical and land use uniformity. For each landscape type, students presented its location, extent and features. Landscape potential was assessed using the Linton method. The most appreciated landscapes in terms of value were forests and natural pastures, while the lowest scores were given to degraded landscapes (industrial areas, landfills, settling ponds, etc.).

In *Chapter III. Landscape vulnerability and imbalances*, students identified and described highly vulnerable landscapes: adjacent to rivers lacking embankments, deforested slopes, with landslides, landscape imbalances were also presented alongside the factors causing them (due to mining activities: settling ponds and waste dumps, mine shafts, quarries; the ecological accident caused by the rupture and spilling of the Bozânta Mare settling pond; manufacturing in Baia Mare, deforestations, overgrazing, landslides, hydrotechnical constructions: the waters of Firiza Lake covered houses, lands, vegetation, etc.).

Chapter IV. Landscape reconstruction and spatial-functional reintegration presents solutions and countermeasures. The students noticed that no landscape reconstruction measures had been taken in the case of industrial waste dumps and settling ponds. The students proposed landfill closure (soil cover, using geo-membranes, grass cover, tree planting), as well as some landscape reconstruction works: slope stabilisation, terracing, reforestations, soil erosion mitigation, forest buffer strips. Within the urban landscape, proposals included consolidation and urbanistic remodelling of old buildings, creation of green areas and parks, underground parking spaces, relocation of industrial areas, conversion of abandoned industrial areas into recreational areas, office spaces, and institutions (The Paintbrush Factory in Cluj promotes contemporary art), introduction of a subway system or a monorail in Cluj-Napoca to ease traffic. Some proposals are viable and useful, others are costly and require tremendous resources.

Analysing the compliance with editing requirements. In all students' papers, the drafting requirements were complied with.

6.3. Evaluation of students' competence level using the assessment tool

C1 - Percentage / number of identified landscapes (m (mean value) - 4.1). They identified a variety and a great number of landscapes, but there were also other landscapes in these vast areas. The identification of landscapes in the field depended on documentation based on bibliographic sources and on their degree of knowledge of the territory.*C2 - Including landscapes in typologies* (m - 3.5). The landscapes were presented within some typologies in five studies, and in one were identified few types of landscapes, which could not be classified. Each type of landscape could be analysed in depth.*C3 - Landscape location and extension in territory* (m - 3.5). The location of the landscapes was specified, but as these were many, the localisation of each elementary landscape unit was difficult. For correct localisation, systematic mapping was required.*C4 – Analysing landscape structure and components* (m - 3.0). It was partially implemented in most of the landscapes, without pursuing a presentation algorithm (a model), although there were some available models / methodologies in the geographic literature. *C5 -*

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Highlighting of characteristics and specificity (m - 3.3). Some features and specific aspects of the landscapes were presented and statements on the predominance / spatial distribution of a particular type of landscape in the studied area were made.*C6 – Thoroughness of the analysis (details)* (m - 3.1). The extension of the project was limited to a certain number of pages and the number of landscapes in each area being large, it did not allow a deep analysis of all landscapes.*C7 - Analysing the landscape dynamics and functionality* (m - 3.1). Only some aspects of dynamics and functionality were highlighted.*C8 - Underlining the aesthetic value of landscapes* (m - 3.3). The fact that many landscapes types were identified in the analysed areas and their distribution in space was generalized, calculating the value of landscapes by the Linton method and representing that value on maps reduced the accuracy of spatial distribution.*C9 - Presenting landscape dysfunction* (m - 3.3). Some vulnerabilities of the landscapes werepresented and arguments were given. Visible imbalances in the landscapes were presented and exemplified, and the causes were also mentioned. *C 10 - Landscape reconstruction and spatial-functional reintegration measures for the degraded lands* (m - 3.3). Some measures were presented, but many were expensive and difficult to apply and could take a long time.*C11 - C12 - Analysing photographs.* In two studies, no photos of landscapes were included. The photos captured a wide variety of landscapes (urban and rural, natural and anthropic, industrial, agricultural, etc.) (Fig. 1-6). In most photos, the homogeneity and specificity of landscapes were captured. Some photos were taken by students (Şuncuiuş, Cluj-Napoca), others were taken over from the Internet, with the references being mentioned (Cluj-Napoca). Capturingspecific aspects in photos is a way of promoting cultural diversity (Cuc, 2013a, 2014).*C13 - C14 – Analysing cartographic material.* All studies included the required maps: hypsometric, land use, elementary landscape units, and landscape value maps. Some studies included other maps as well (e.g. location of the studied area, vegetation map, hydrographic network). For students, it was difficult to set up the legend and determine what landscape is specific or predominant in an area. Representations of elementary landscape units on maps had a high degree of subjectivity / generality. Detailed mapping would have required rigorous mapping in the field first (Figure 01 to 06).

Figure 01. The quarry landscape culture (Zece Hotare) (Photo by Toderaş, 2016)

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Figure 02. The landscape of fodder beet culture (Photo by Toderaş, 2016)

Figure 03. Anthropic lake landscape (Zece Hotare) (Photo by Toderaş, 2016)

Figure 04. Anthropic terraces landscape (Photo by Ciocan, 2015)

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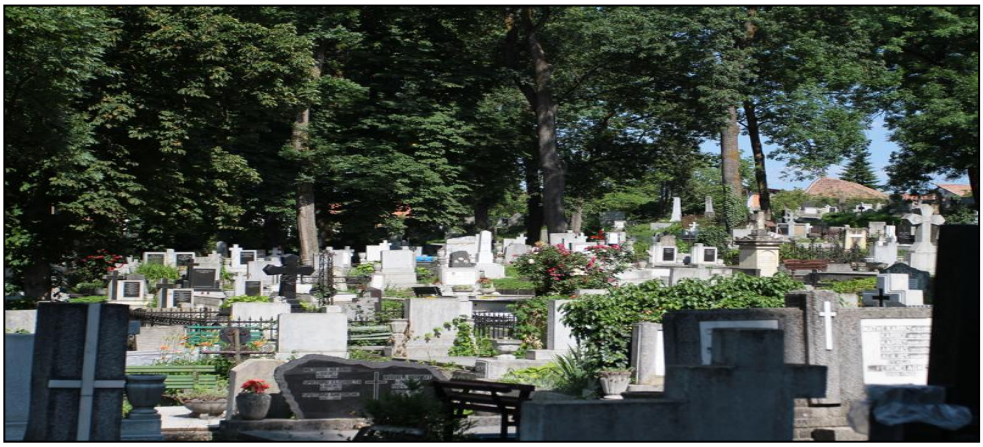

Figure 05. The cemetery landscape The Central Cemetery in Cluj-Napoca (Photo by Muntean)

Figure 06. Industrial Landscape The "Carbochim" Industrial Complex in Cluj-Napoca (Photo by Muntean)

Analysing the competence level. Based on the evaluation of the works with this tool, Table 2 shows that the students' level of competence to analyse geographic landscapes is at a higher level of competence in one case (m - 4.5) and at medium competence level (m > 2.3) in the other cases. These results indicate that students used the information and directions from the university course on the Geography of Landscape and on other subjects, carefully studied the recommended references, and met the given requirements, all of these contributing to their case study. The successful achievement of these projects is the result of an efficient didactic communication (Cuc, 2013b, 2014) and the capitalization of all the learning styles of the students in order to develop their professional competences (Cuc, 2013b; Chiş & Grec, 2017).

Analysing difficulties. From the analysis of the bibliographic references included at the end of the case studies, we noticed that students consulted few works on landscape typology, as there was not much bibliography in Romania on that topic (it began to be studied more intensively after 1989). The students had difficulty in the systematic and in-depth presentation of the landscapes and the fact that in the

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specialised works from Romania there were only few models for analysis (Baciu, 2014; Drăguţ, 2000; Popescu, 2010) and models of landscape studies were missing (or there were few). The fact that in international literature, geographic landscapes are classified according to quite varied criteria, had also represented a difficulty in systematising the presentation of landscapes within the study. Another problem was to include a landscape into a particular landscape type because depending on various criteria, a landscape can be included into several classes/categories.

Suggestions and measures. In order to overcome difficulties and to increase the competence level of analysing geographic landscapes (Figure 07) and in establishing the measures for landscape reconstruction of degraded ones, we consider that it would be necessary to study more substantial bibliographic sources also from abroad (richer / in-depth theoretical foundation). For students, it would be very useful to study landscape analysis models and the methodology of studying and presenting such studies. By implementing this project, independent learning and reflexive thinking of future teacher students is stimulated and developed (Peculea et al., 2017). In the formation of this competence, several stages specific to the competence-based curriculum design were developed (Andronache, Bocoș, & Neculau, 2015). In addition, direct knowledge of the territory through field trips improves students' competence level, as previous research proved (Dulamă et al., 2017a, 2017b; Ilovan et al., 2018).

Table 02. University students' competence level to analyse geographic landscapes and to establish landscape reconstruction measures

Assessed aspects	**Criteria**	**Settlements (scores from 1 to 5)**						**Average**
		A*	B	C	D	E	F	
Presenting landscapes in text	C1	4	3	5	3	4	3	**4.1**
	C2	4	2	5	3	4	4	**3.5**
	C3	4	3	5	3	4	3	**3.5**
	C4	4	2	4	2	3	3	**3.0**
	C5	3	2	5	2	4	4	**3.3**
	C6	3	3	4	2	4	3	**3.1**
	C7	3	3	4	2	4	3	**3.1**
	C8	3	3	4	3	4	3	**3.3**
	C9	3	3	4	3	4	3	**3.3**
	C10	3	3	4	3	4	3	**3.3**
Representing landscapes in photos	C11	3	-	5	2	3	-	**2.1**
	C12	3	-	5	3	3	-	**2.3**
Representing landscapes on maps	C13	3	3	5	4	4	4	**3.7**
	C14	3	3	5	4	4	4	**3.7**
Average		**3.2**	**2.3**	**4.5**	**2.7**	**3.7**	**2.6**	**3.1**

* A – Șuncuiuș; B – Urmeniș; C – Cluj-Napoca; D – Târgu-Lăpuș; E – Baia Mare and Tăuții-Măgherăuș; F – Mioveni

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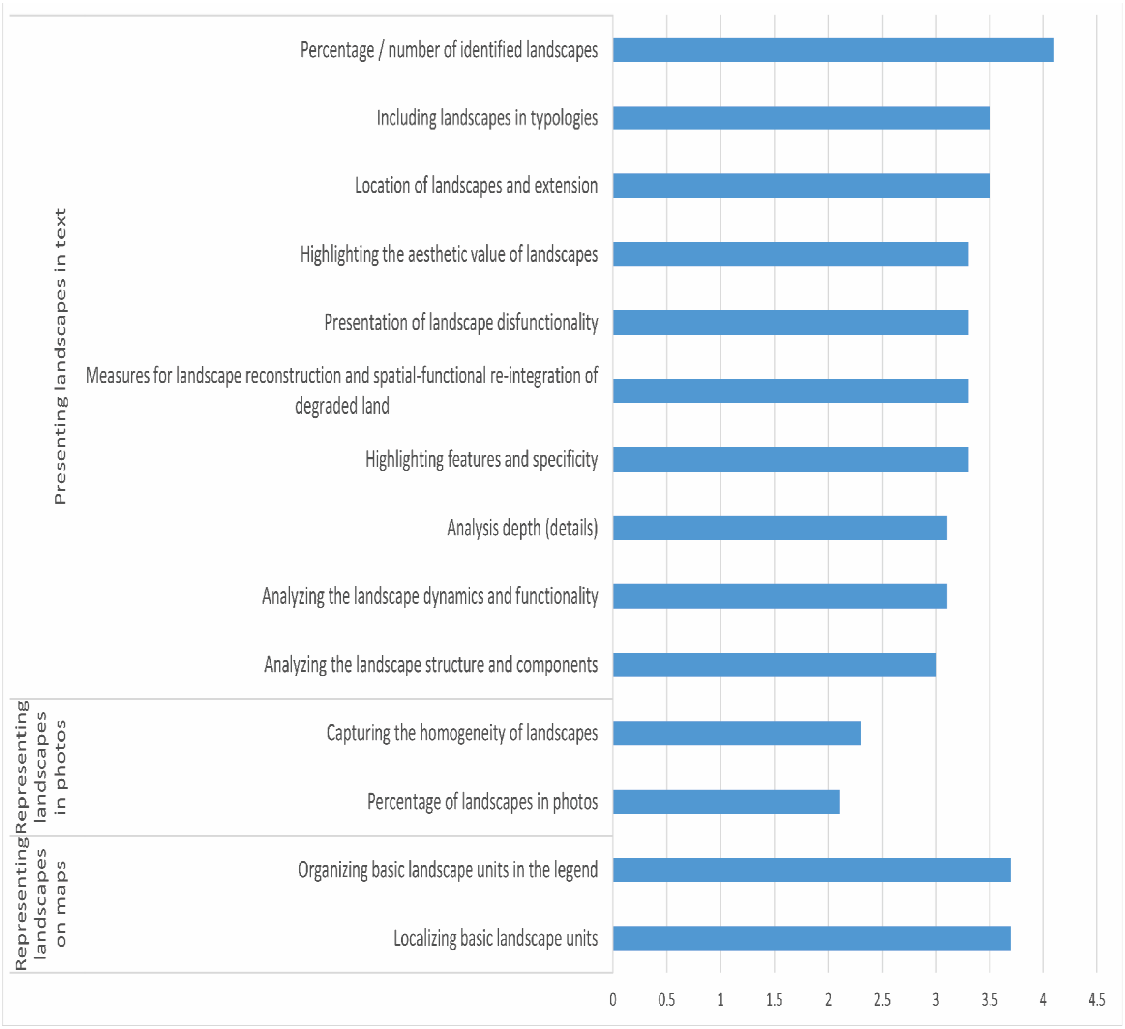

Figure 07. Students' competence level to analyse geographical landscapes, for each criterion

7. Conclusion

In order to form the competence to analyse the geographic landscapes in an area chosen by the student, it is efficient if they know it from the field, thoroughly, had done other studies in that territory as well, live there, are familiar with the landscapes. For developing the competence, it was important that students carried out the case study at home, outside course classes and seminars, at their own pace, allocated the necessary time resources for documenting and producing visual materials (photographs and maps), had time to go in the field to take photos, and were able to take photos from the Internet.

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