# PERCEPTIONS OF THE GEOMORPHOLOGY OF GEOGRAPHY TEACHER CANDIDATES

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**Abstract**

*Aim: The purpose of the study, which is the main theme of geography teacher candidates to determine the cognitive level of geomorphology.*

*Methods: The data of the study, Geography Teacher Grade 4 students were obtained by independent word association test applied to. The obtained data are classified by investigators according to semantic relationships.*

*Findings: The categories examined, the frequency and percentage, environmental awareness, organizations concerned with the environment, combating climate change and environmental issues to be considered waste has come to the fore.*

*Result and Discussion: Clear statements about the geomorphology of Geography Teaching students observed that the difficulty in letter. Difficulty in expressing even though, they knew the subject and are experiencing a lot of confusion.*

**Key words:** *geomorphology, perception, candidate teacher, geography*

## 1. INTRODUCTION

To understand how students get the information and configure it in their minds is an important issue not just for educators but for geography education researchers. Constructivist learning theory argues the idea that information is configured by individuals through associating it with his/her preliminary information and experiences. In this context, the perceptions of students about Geomorphology and the issue how they configure it is important.

Today geography is divided into many subfields. These fields have diversified due to the technological improvements and increasing knowledge. And this is important for organizing the information and taking more advantage in interested branch by going deeper. Thus, the other scientific fields have emerged from the geography, which was a whole scientific-discipline at the beginning, with the diversity and increase in the information about earth (Üçışık & Demirci, 2002). One of the scientific fields of Geography is Physical Geography and it contains many subfields in terms of its concerning subjects.

Physical geography is a composite discipline of several interconnected scientific subfields, each of which has standing in its own right. While some disagreement exists on the relative importance of, and even the number of, recognized subfields, most practitioners would agree that four–biogeography, climatology, hydrology, and geomorphology (with foci on the biosphere, atmosphere, hydrosphere, and lithosphere (taken conceptually) –subsume the bulk of the research in physical geography (Malanson et. al. 2014). Geomorphology which is in the scope of Physical Geography is a science explaining how and with which factors the earth formed (Atalay, 1992). Geomorphology is a science dealing with the landforms and their occurrence. It examines with caring the internal and external factors and main tectonic movements (Benner, 2003). Geomorphology is the study of the form of the earth. Geomorphology is one of the most comprehensive and complicated fields of geography and it has many subjects such as; structural, karst, fluvial, arid and semi-arid areas, volcano and klimageomorphology.

Klimageomorphology is in fact a subject fulfilling the structural geomorphology and explains the climate depending configuration on main relief (Erol, 1992). Geomorphology is a scientific field examining the lithosphere's forms seen on earth, explaining their formation and evolution, classifying

them, exploring the geographic expansion and groups with its reasons on lands and under the seas (Erinç, 1996). Geomorpology is a science describing the landforms that was created by internal and external factors, processes and examining the formation, development and geographical distribution (Güney, 1993). The word geomorphology, which means literally to write about (Greek logos) the shape or form (morphe) of the earth. First appeared in 1858 in the German literature (Georgy & Gouide 2011). Geomorplogy is a highly complex science that involves elements of geography and geology, and concerns the study of, and explanations for, landforms at various temporal and spatial scales. This review focuses on those aspects of geomorphology that highlight its global importance. Each landform is the consequence of a complex interaction between bedrock, changing climate, biological activity, geomorphic processes and time. The role of geomorphologist is to unravel this complexity from the relief, where the remnants of past deposites and landforms constitute a palimpsest from which most information has disappeared (Garcia-Ruiz, 2015). Allusion to concepts in geomorphology is a paradox – frequently mentioned but seldom explicitly analysed. This is surprising in view of the frequent use of the word 'concept' in many papers and also in view of the way in which concepts, which have been so fundamental in philosophy, are vital to the development of any discipline. Geomorphology has now developed to such an exciting and productive stage that it is appropriate to focus more explicitly upon the underlying concepts (Gregory, & Lewin, 2015). The last decade has seen a revolution in the geomorphological techniques and approaches applied to understand tectonics at a range of spatial and temporal scales. In some instances, the results have been remarkably elegant; in other cases, the lack of consensus has highlighted the complexity of the problem, and raised more questions than have been answered (Brocklehurst, 2010). Modern geomorphology was founded in the nineteenth century as an exercise of historical interpretation of landscapes. After the mid-twentieth century it dominantly became a quest to understand the processes by which landscapes are modified (Church, 2010). In the past periods, there have been considerable debates about the scope and topic areas of geomorphology. Taking the scope and subjects of the Geomorphology into account, different definitions have been tried to be created.

One of the approaches reflecting this different view is Structural Geomorphology which focuses on the relationship between structure and relief and in the formation of the landforms; it holds the role of evaluation factors in the concept of structure in the foreground. A second approach is the Analytical and Dynamic Geomorphology which holds the role of external forces and processes in the foreground. Then the subject of Applied Geomorphology has also become a current issue (Erinç, 1996). As a result, when analysed in the context of all these approaches; geomorphology, with its concerning subjects, is a multidisciplinary science ranging from climatology to geophysics.

## 2. OBJECTIVE OF THE RESEARCH

In this research, the level of information and misconceptions that geography students have about the concept of "geomorphology" were tried to be determined using free word association test. When choosing the subject of Geomorphology, the diversity of its concerning subjects was taken into account. One of the objectives of the study is to determine how to differentiate the Geomorphology that is a comprehensive science discipline from other Physical Geography subjects

## 3. METHOD

Qualitative research method was used in this study. According to Şimşek (2011); the main feature of qualitative case study is to research one or more situations deeply. It is possible to say that case study is a research method which takes the questions of how and why as a baseline and enables the researcher examine a concept or event deeply which he/she cannot control.

*3.1. Working group.* Working group consists of 4th and 5th grade students in the Geography Teaching Department of Ahmet Keleşoğlu Faculty of Education, in Necmettin Erbakan University in 2015-2016 academic year. While choosing the sample group, 4th and 5th grade students were preferred because fewer students have been taken to the High School Social Studies Education departments in the last years. In fact, the lesson of 'Geomorphology' is given to the 1st and 2nd grade students but survey wasn't applied the students in these classes due to their number. Although a quota is given to the departments of High School Teaching approximately for 20 students, there are 15 – 20 students in each class because of the students who don't register to the school or don't attend the classes after register. 63 students attended the test and their sex and age ranges weren't taken into account.

*3.2. Data Collection Instrument.* Word Association Test (WAT) was used as data collection instrument in this study. According to Wettler and Rapp (1996): In a typical word association test, subjects are asked to respond to a stimulus word with the first word that comes to their mind. These associative responses have been explained by the principle of learning by contiguity: "objects once experienced together tend to become associated in the imagination, so that when any one of them is thought of, the others are likely to be thought of also, in the same order of sequence or coexistence as before" transmitting, (Spiteri, 2005). The word association test is a common method within psychology which has been used to reveal the private world of an individual. In its simplest form a series of disconnected words (stimulus words) are projected orally or in writing to the respondents who must respond with the first word which comes to mind (response words). These associations reveal the respondents' verbal memories, thought processes, emotional states, and personalities (Nielsen & Ingwersen, 1999). There are different variations of word association tests but the underlying principle remains the same: stimulus words are presented to the subject (either verbally or in written form) who is asked to respond with the first word or words that come to mind. The resulting word association is thought to mirror the way the words are stored and linked in the mental lexicon (Peppard, 2007). In a word association test, a list of words is presented to subjects, who is asked to respond with the first word that comes into their mind, and this gives information on the way knowledge structures in the human mind (Nekah, et al. 2013). Free word association test requires responses that are not restricted to any specific category or class of words. In tests of discrete word association, each participant is asked to produce only a single associate to each word, while in tests of continuous association, the stimulus word or the list of stimulus words is presented to the respondents only once and they are asked to give as many associations as they can in a pre-specified period of time (Kostova & Radoynovska, 2010). For solving a number of practical problems word association technique proved to be very valuable. Word association technique applies different types of questionnaires: a table with two columns (first column – list of stimulus words, second column – associated words), sentence completion (a list of sentences to be finished with more than one example for each sentence, list of stimulus words with spaces to fill in the associated words at a given time under a given situation (Kostova & Radoynovska, 2008).

The concept of "geomorphology" was selected with the aim of creating WAT. Additionally, it was consulted to two lecturers in geography department while selecting this concept. Students were informed about WAT and given 60 seconds to write 10 statements about the concept of "geomorphology".

When examined the works in literature, it is seen that thirty, sixty or seventy-five seconds are given to each concept in word association test (Bahar, et al. 1999; Bahar & Özatlı, 2003). Students were asked to write down 10 statements which key-concept brings to their mind. In the phase of applying the test, it was cared if students write meaningful sentences about the statement words they wrote corresponding to key concept and all the sentences written were examined one by one. Because response word, associated with key concept, may be an association product not having a meaningful relationship with the key concept only in recalling level. Only one keyword was used in the research. In word association tests, there are also studies which used more than one concept or there are even studies which the intersection of these words was taken. Thus, it was studied for analyzing the

cognitive structures of students about the key concept of "geomorphology" and detection of possible misconceptions.

*3.3 Data Analysis.* Content analysis method was used while analyzing the data obtained from word association test. The main objective in content analysis is to reach the concepts and relationships explaining the data collected. With this aim, it is required to conceptualize the collected data firstly and then arrange it according to concepts emerged.

Content analysis is to interpret the similar data by integrating under certain themes and concepts and editing so that readers can understand (Yıldırım & Şimşek, 2011). In WAT analysis, all the response words given for the key concept by students are detected one by one. Similar response words are combined and categorized according to their titles. A frequency table is prepared by calculating how many times different words are repeated in each category (Atasoy, 2004). At the test result phase, although 630 statements were expected to be written by 63 students, 529 statements were observed to be written. It was seen that some students had difficulty in writing 10 statements and a few of them wrote unrelated statements. The results of the word association test were sorted from the highest to lowest according to their frequencies of correct connections regardless of their wrong words. With the light of this information, data obtained from the test were analyzed by using the number of the most frequently repetition and the technique of semantic relation. All the answers given for the key concepts were examined deeply with the aim of evaluating the test results.

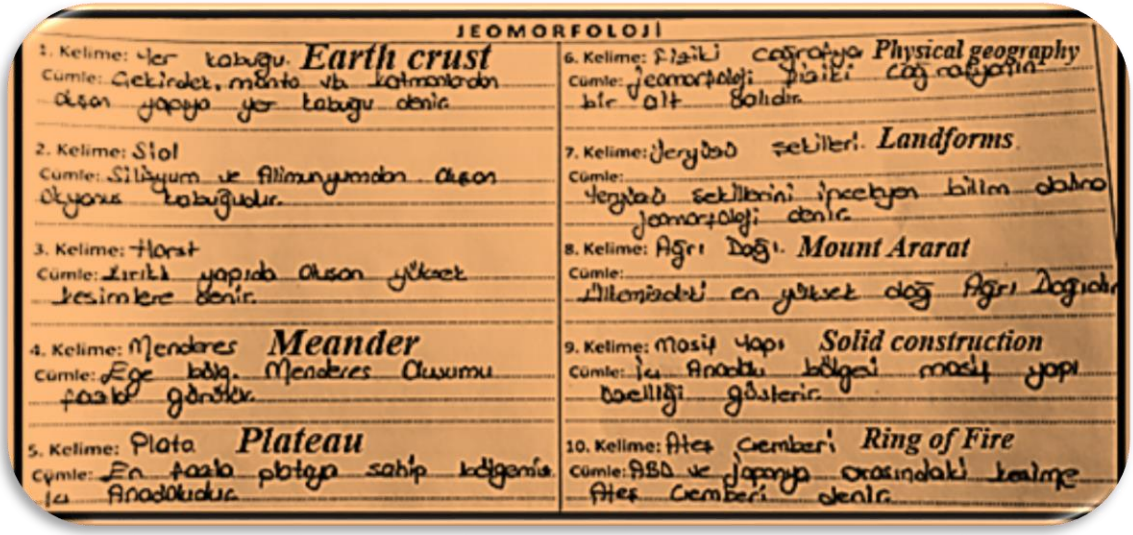



**Figure 1.** An example of a key grip express written word.

## 4. FINDINGS AND INTERPRETATION

In this section, data obtained from the word association test and content analysis were tried to be evaluated and interpreted by presenting it as tables.

**Table 1.** A category of statements describing the relationship between of geomorphology and topography.

| **Statements** | **Frequency** | |
|---|---|---|
| Landforms | 131 | |
| Structure types | 27 | |
| Karst topography | 25 | |
| Arid and semi-arid topography | 15 | |
| Volcano topography | 16 | |
| Fluvial topography | 9 | |
| Glacial topography | 7 | |
| Tor topography | 3 | |
| **Total expression and category 525** | **233** | **%44,3** |

When first category (table1) is evaluated, it draws attention that the thoughts that students stated comprise the structure types that geomorphology deals more. It may be seen that every one of these structural types is studied as different lectures in some faculties (especially in faculties which trains researchers). For example; Structural Geomorphology, Glacial Geomorphology, Arid-Semiarid Areas Geomorphology etc. As mentioned at the introduction part of the study, the content of the geomorphology is very wide and indeed, every one of them is comprehensive enough to be studied as a lecture. Considering the table, most commonly written statement is landforms. This statement is in fact tells the essence of geomorphology. Other statements describe the feature of the structure in the formation of the landforms more. It is reached to the conclusion that students are aware of the impacts of different structural features to the forming of landforms. Rate's being at the level of %44.3 shows that students' cognitive structures about the concept of geomorphology are at the good level. One of the most remarkable points here is that none of the students wrote the statement of climageomorphology. In this context, it is seen that students don't have any information about the subject which Prof. Dr. Oğuz Erol, one of the veterans in physical geography in Turkey, wrote a book.

**Table 2.** A category of statements related to forming of topography forms in geomorphology.

| **Statements** | **Frequency** | |
|---|---|---|
| Endogenic forces | 61 | |
| Valleys and valleys types | 50 | |
| Fault | 20 | |
| Abrasion | 16 | |
| Exogenic forces | 12 | |
| Stratification | 15 | |
| Plate tectonics | 12 | |
| Deposition | 9 | |
| Isostatic equilibrium | 7 | |
| Coast and coastal types | 4 | |
| Continental shelf | 3 | |
| Landslide | 3 | |
| Antiklinal | 8 | |
| Synclinal | 6 | |
| Slope | 6 | |
| Drainage | 5 | |
| Abrasion platform | 4 | |
| Erosion | 3 | |
| Transport | 3 | |
| Outcrop | 2 | |
| **Total expression and category 525** | **157** | **%29,9** |

In this category, geomorphologic forms, the materials and factors that create these forms are given. Among the ideas that students state in this category, the frequency of internal forces which have an important place in the forming of the landforms is very high. As known, internal forces provide the initial formation of the landforms. The activities of the external forces start after this stage. And when some statements are taken into account such as fault, isostasy, plate tectonics, synclinal and anticlinal, the rate of the internal forces is quite high. Students' using a statement like isostatic balance shows that they don't have information about details. The concept of isostasy already shows the balance. Statements written most after internal forces belong to external forces. Students here both wrote internal-external forces statements and mentioned about internal-external forces. They stated some of the external forces such as; landslide, drainage and accumulation.

But the rate of these opinions in the distribution of the table is very low. The interpretation that can be made about this category is students' having information about the forces forming the landforms in general. The point that can be criticized is their not giving any place to the concepts of time and process. The words that are in the scope of the concept of process were written down but this statement, which they heard so much before, isn't included.

**Table 3.** A category of statements that have a little direct-connection to geomorphology

| **Statements** | **Frequency** | |
|---|---|---|
| Geomorphology | 35 | |
| Rocks | 32 | |
| The layers of places | 17 | |
| Geological time table | 12 | |
| Geomorphologist | 11 | |
| Pangea | 6 | |
| Continent | 4 | |
| Geographer | 4 | |
| Age determination | 3 | |
| Mineral | 2 | |
| Fossil | 2 | |
| Spring water | 2 | |
| **Total expression and category 525** | **130** | **%24,7** |

When this category is evaluated semantically, statements except for the geomorpholog are not directly related to the concept given. Students included the statements such as geographer and geomorpholog which connote a discipline. These fields, of course, connote the concept of geomorphology. But it is not suitable to put them into other categories. The statements written except for these two statements, connote the subjects of geology more than geomorphology. It is also not possible to detach the statements in this table from the geomorphology completely. In fact, the areas of geomorphology and geology are not detached from each other at all. So rocks, minerals and fossils' etc. being written shouldn't be found odd. This can be evaluated as a misconception. But, it should not be considered as expressions completely away from the concept of geomorphology.

Apart from three categories mentioned, there are also some expressions written by students which repeated only once and wasn't subjected to classification. Expressions out of categories are; *current, altitude, pyroclastic material, ocean and random rains.* Some of the statements mentioned such as *altitude and pyroclastic materials* connote the forming of landforms; however, statements such as *ocean and random rains* include the misconceptions about geomorphology.

## 5. RESULT AND DISCUSSIONS

When looked at the overall findings of the survey, it is remarkable that statements written by students most represent a high percentage (44%) and they are about structural properties which are in the scope of geomorphology. This category's being at a high percentage is very significant for this research. Because words to be remembered most related with the concept of geomorphology are supposed to be these words. The high percentage of opinions collected in the second category is also important for the research. Being represented with a rate close to 30%, this category includes the factors that make up the landforms. When considering that it is not possible to keep separate the landforms and their formations, the emergence of these results is pleasing. The level of information about factors that make up the landforms is observed to be in good condition in students' minds. A point that can be criticized here is that students lack a bit in the writing the landforms. When looked at the third category, it is seen that students didn't mention about the expressions that are far away from

geomorphology. Those in this category are the statements that might be indirectly associated with geomorphology.

In a study by Gregory & Lewin (2015) '*Making Concepts More Explicit for Geomorphology',* with the idea that the conceptual richness of geomorphology is not fully reflected in traditional scientific studies, it was investigated how to increase the richer conceptual teaching and students' interest. They conclude that there have been shortcomings in teaching of many of the concepts in geomorphology so far. Church (2010), in his study of *"The Trajectory of Geomorphology"*, stated that many studies (microorganisms, space, climate etc.) have contributed to the development of geomorphology discipline. He mentioned that geomorphology improves in different ways at the same time and on the one hand it becomes a geophysics science and on the other hand it deals with subjects such as; human impacts on environment, environmental change, conservation ethic and human. Martinez, et al. (2011), carried out a study of "*Learning to Observe in a Geomorphological Context*". In this study, they formulated questions in cooperation to develop students' observation skills and their understandings about erosion, transportation and sedimentation and they made the students read and write. At the end of the practice, they identified that the students attending the course, were able to discuss how the slow movements of the water change the land, define some factors effecting the percentage of land's being exposed to erosion and use suitable words to debate on the issue. Orme (2002) mentioned about those subjects in his study of "*Shifting paradigms in geomorphology: the fate of research ideas in an educational context"*; geomorphology education, history of the world, glaciation, mass movement, continental movements, erosion and drainage nets. And with handling theories like them, it is seen that new theories are accepted. The acceptance of new ideas to geomorphology books was neglected more than 200 years. New ideas were generally confronted with institutional conservatism, language obstacles, perceiving it as surrealism and simple illiteracy. Brierley (2009) mentioned about the following properties in his study of "*Communicating Geomorphology*". Geomorphology principles, when effectively used, provides critical guidance for environmental management. The importance of time and spatial observation on the landscape is great. Geomorphic understanding reflex makes it easier to clearly understand the findings of several factors. Having geomorphological approach makes a good impression while making a speech to the audience at school-university classes and for politicians and administrators. Sack (2002) draws attention to the following issues in his study of "*Geomorphology and ecology: Unifying themes for complex systems in biogeomorphology".* Geomorphological history can be a valuable tool for students' geomorphology training. Being reached to most of the studies of geomorpholgs and their thoughts is important. It provides different perspectives to the students to make use of the original source and contributes while giving decisions. Geomorphologic historical resources' taking place in the curriculum will develop a perspective for understanding the past and future in the contemporary earth works. Stallins (2006) dealt with the interaction between geology and geomorphology in his study of "*Geomorphology and ecology: Unifying themes for complex systems in biogeomorphology".* His views can be summarized as follows; the interaction of geomorphic and ecological landscape components is conceptualized largely independently. In one aspect, geomorphological processes and forms shape the distribution of all living creatures. In contrast, in the other aspect, (biota) living creatures changes geomorphic processes and forms. Geomorphology and ecological interactions between the components are located in more intimate. He mentioned about four themes characterizing biogeomorphology. These are; multiple causality and perception renewal, the effect of the organism as ecosystem engineers, explanation of ecological topology and ecological memory. All these themes show the connection of geomorphological systems. Biogeomorphology is needed to move beyond the description of one-way interaction of geomorphic and ecological components. Güldalı (1978), defined geomorphology as follows; it emerged in 1930s and developed at the border between the Physical Geography and Geology and at the same time it fills the gaps in both disciplines and enriches them. In the years when geomorphology began to develop as a science, all the attention was given to the examination of landforms and their comments, but now in addition to the processing of general geomorphological issues, geomorphological research increasingly has become an indispensable part of geological exploration and survey (Güldalı 1978).

When taken together with the results of the research and the studies mentioned above, it is possible to conclude that geomorphology is a comprehensive branch of science. Teaching geomorphology better and concept richness are properties mentioned in almost all studies. And biomorphology is a concept by Stallins that never mentioned in the study and not mentioned about it much in our country. This statement wasn't also found in sources about geomorphology. In the printed resources of geomorphology, the width of the scope of the geomorphology is always emphasized but this statement is not written in anywhere. Acceptance of biogeomorphology may contribute to the concept of geomorphology.

The findings of the study indicate that geography teacher-candidates have a general knowledge about the science of the geomorphology. Considering that geomorphology is a science which has a very wide scope, it was pleasing that students did not write statements that away from subject. When looking at the debates about the scope of the geomorphology from past till now, this result shows that there are not many misconceptions.

When it comes to the proposals that can be suggested in this context, it would be appropriate to mention the following points.

There is a benefit in teaching the wide scope of geomorphology.

The interests of the geomorphology are required to be taught to students better. Especially it is necessary to teach the connections and differences between the geomorphology and geology.

Learning geomorphology thoroughly brings a broad perspective when addressing the many issues for geographers and therefore it is necessary to make it comprehend that it has a great importance.

## REFERENCES

Atalay, İ 1992, *Genel Fiziki Coğrafya*, Ege Üniversitesi basımevi, İzmir.

Atasoy, B 2004, *Fen Öğrenimi ve Öğretimi*, 2. Baskı, Asil Yayınevi, Ankara.

Bahar, M & Özatlı, S 2003, *Kelime İletişim Testi Yöntemi İle Lise 1. Sınıf Öğrencilerinin Canlıların Temel Bileşenleri Konusundaki Bilişsel Yapılarının Araştırılması*, Balıkesir Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 5 (1), 75- 85.

Bahar, M, Johnstone, AH & Sutcliffe, RG 1999, *Investigation of Students'Cognitive Structure in Elementary Genetics Through Word Association Tests*, Journal of Biological Education, 33, 134-141.

Bahar, M, Nartgün, Z, Durmuş, S & Bıçak, B 2006, *Geleneksel ve Alternatif Ölçme Değerlendirme Öğretmen El Kitabı,* Pegem Yayıncılık. Ankara.

Bremer, H 2003, *Geomorphology*, Geography (Vols. 1-2), Ed: Maria Sala, eISBN: 978-1-905839-60-5, 978-1-905839-61-2, EOLSS, Publications, Catalogue. pdf.

Brierley, G 2009, *Communicating Geomorphology*, Journal of Geography in Higher Education, Vol. 33, No. 1, 3–17, DOI: 10.1080/03098260802576899.

Brocklehurst, SH 2010, *Tectonics And Geomorphology*, Progress in Physical Geography, 34(3), 357-383.

Church, M 2010, *The Trajectory Of Geomorphology*, Progress in Physical Geography, 34(3) 265–286, ppg.sagepub.com, DOI: 10.1177/0309133310363992

Creswell, JW 2013, *Nitel Araştırma Yöntemleri*, Transmitting Ed: Mesut Bütün ve Selçuk Beşir Demir, Siyasal Kitapevi, Ankara.

Erinç, S 1996, *Jeomorfoloji-I*, Öz Eğitim Yayınları, ISBN: 975-8004-12-2, İstanbul.

Erol, O 1992, *Klimajeomorfoloji, I-Genel Koşullar*, İ.Ü. Deniz Bilimleri Enstitüsü, Yayın no: 10, ISBN:975-404-259-4, İstanbul.

Garcia-Ruiz, JM 2015, *Why Geomorphology İs A Global Science*, Cuadernos de İnvestigacon Geografica, 41(1), 87-105 Issn: 0211-6820, DOI:10.18172/cig.2652

Gregory, KJ & Gouide, A 2011, *Introduction to the Discipline of Geomorphology*, SAGE publication Ltd, ISBN: 978-1-4129-2905-9, London

Gregory, KJ & Lewin, J 2015, *Making Concepts More Explicit For Geomorphology*, Progress in Physical Geography, 39(6), 711-727.

Güldalı, N 1978, *Jeomorfoloji ve Ekonomi Uygulamalı Jeomorfolojinin Sorunları*, A.W. Siderenko, (Transmitting: Nuri Güldalı), Yeryuvarı ve İnsan Dergisi, sayı: Şubat 3/1, 28-31.

Güney, E 1995, *Jeomorfoloji Sözlüğü*, Eko yayınları: 04, Ankara.

Huggett, R.J 2007, *Fundamentals of Geomorphology*, Second Edition, Routledge Fundamentals Of Physıcal Geography Series, Ed: Gerrard, J. ISBN 0-203-94711-8 Master e-book ISBN, <http://www.cec.uchile.cl/~fegallar/Fundamentals_of_Geomorphology.pdf>

İslamoğlu, AH 2009, *Sosyal Bilimlerde Araştırma Yöntemleri*, Beta Basım Yayın Dağıtım A.Ş., Y. N: 180, 2009, İstanbul.

Kostova, Z & Radoynovska, B 2008, *Word Association Test for Studying Conceptual Structures of Teachers and Students*, Bulgarian Journal of Science and Education Policy (BJSEP), Volume 2, Number 2, 209-231.

Kostova, Z & Radoynovska, B 2010, *Motıvatıng Students' Learnıng Usıng Word Assocıatıon Test And Concept Maps*, Bulgarian Journal of Science and Education Policy (BJSEP), Volume 4, Number 1.

Malanson, GP, Scuderi, L, Moser, KA, Willmott, CJ, Resler, LM, Warner, TA & Mearns, LO 2014, *The Composite Nature Of Physical Geography Moving From Linkages To İntegration*, Progress in Physical Geography, 38(1), 3-18.

Martínez, P, Ritland, BB, Peters, EE & Baek, J 2011, *Learning to Observe in a Geomorphological Context*, Science Activities: Classroom Projects and Curriculum Ideas, 48:1, 13-22, DOI: 10.1080/00368121.2010.493903.

Nekah, SMA, Akhlaghi, E & Ebrahimi, S 2013, *An Assessment Of Lexıcal Sense Relatıons Based On Word Assocıatıon Test*, European Scientific Journal, April edition vol.9, No.11 ISSN: 1857 – 7881.

Nielsen, ML & Ingwersen, P 1999, *The Word Association Methodology - A Gateway To Work-Task Based Retrieval*, Final Mira Conference, 17-27, <http://www.bcs.org/upload/pdf/ewic_mi99-paper6.pdf.>

Orme, AR 2002, *Shifting Paradigms In Geomorphology: The Fate Of Research Ideas In An Educational Context*, Geomorphology, 47, 325–342, www.elsevier.com/locate/geomorph.

Paker, T 2015, *Nitel Araştırma: Yöntem, Teknik, Analiz Ve Yaklaşımları*, Anı Yayıncılık, Ankara.

Peppard, J 2007, *Exploring The Relationship Between Word-Association And Learners' Lexical Development*, <http://www.birmingham.ac.uk/documents/college-artslaw/cels/essays/.pdf.>

Sack, D 2002, *The Educational Value Of The History Of Geomorphology*, Geomorphology 47, 313 - 323.

Spiteri, LF 2005, *Word Association Testing and Thesaurus Construction: A Pilot Study*, Cataloging & Classification Quarterly, 40:1, 55-78, DOI: 10.1300/J104v40n01_05.

Stallins, JA 2006, *Geomorphology And Ecology: Unifying Themes For Complex Systems In Biogeomorphology*, Geomorphology, 77, 207–216, www.elsevier.com/locate/geomorph.

Üçışık, S & Demirci, A 2002, *The Geography Science And Its Main Components in The 21' Century*, Marmara Coğrafya Dergisi Sayı: 5, 117-133, İstanbul.

Wolf, J, Stanton, M & Gellott, L 2010, *Critical Thinking in Physical Geography: Linking Concepts of Content and Applicability*, Journal of Geography, Volume 109, Issue 2, ISSN: 0022-1341.

Yıldırım, A & Şimşek H 2011, *Sosyal Bilimlerde Nitel Araştırma Yöntemleri*, Seçkin Yayıncılık, Ankara.