Full Length Research Paper

Metaphors developed by high-school students towards the concept of "flood"

Yusuf KILINÇ

Marmara University, Department of Geography, Eğitim Mh.,34722 Kadıköy/Istanbul Province, Turkey.

The aim of this research is to define and explain how high school students in Turkey perceive the concept of "Flood". The study was completed by 413 high-school students who were studying in 9th, 10th, 11th and 12th grade classes within the 2011 to 2012 academic years. Students were responsible for completing the statement, "Flood is like ...., because ....". The Content Analysis Technique, as part of a Qualitative Research Method, was used to analyse and interpret the collected data. At the end of the study, 10 conceptual categories are exposed. 80 high school students perceived "Flood" as "a scary and terrifying event", 67 students said a flood "is a natural hazard", 57 students said a flood is "an event causing life and property loss", 44 students said a flood is "a natural event", 35 students said a flood is "a burning and destroying event", 35 students said a flood is "an event altering the human psychological state", 30 students said a flood is "a way of expressing death", 27 students said a flood is "an event wiping away everything", 27 students said a flood is "a prudent event", and 11 students said a flood is "an unpredictable event".

Key words: High schools, flood, phenomenography, geography education.

INTRODUCTION

The term "flood" can be used literally and metaphorically. Hydrologists think of rivers as links in the hydrological cycle that transport runoff water from the continents to the sea or to the center of endoergic basins (Curry, 1972). A flood is a natural hazard that occurs on the land surface due to precipitation. A flood has an irregular regime that contains a high mass of water that submerges a part, or even all parts, of the surface.

Floods and rapidly moving water are responsible for dramatic changes in channel size and configuration, sometimes forming new channels. In cities where paved surfaces cover soil that would otherwise have absorbed or held water, runoff is accentuated so that nearby rivers and streams rapidly increase in size and velocity after heavy rains (Getis et al., 2008). No matter where you live—whether in the tropics, the plains, or the desert-floods can occur anywhere in the world.

The flood is not sufficiently known as a bad natural hazard. Before an evaluation of the environmental effects of flood is made, it is critical to establish the impact of flood on environmental losses and benefits. This is complex, because while the immediate impression is one of the damages and destruction involved in a flood, flood events play an important role in the maintenance of biodiversity and ecosystem function of river systems in the long-term (Poff et al., 1997). Therefore, floods have some benefits.

A flood can supply ground water and make soil more fertile, while providing nutrients. Floods refresh flood-plains and provide more opportunity for biodiversity.

E-mail: yusuf.kilinc@marmara.edu.tr.

Some water organisms, such as fish, can move to new habitats with the aid of flood. Floods also help to give many native species a "leg-up" on invasive species. Periodic floods transport the eroded soil and other materials that are essential for delta areas and coastal marshes, allowing these areas to persist over time. For example, the reduced flow of normal sediments in river waters due to levees and other flood control structures results in the loss of more than 30 square miles of marsh and delta habitat per year along coastal Louisiana (Ecological Society of America).

Climatic features, vegetation cover, physical landscape and human factors are the main reasons of flood. At the same time, excessive rainfall, eroded riverbanks, snowmelt and tidal surges are some of the reasons for flood, as well.

The worst flood events known in history have happened in China. For example, in the flood of the Huang He (Yellow) River in China in 1931, between 1,000,000 to 3,700,000 people lost their lives. Flood catastrophes take many lives; however, people try to protect themselves from such environmental disasters by taking educational courses. There are some well-known institutions offering these in different parts of flood areas; for instance, FEMA, the California Specialized Training Institute, the Australian Emergency Management Institute, the Asian Disaster Preparedness Center and the International Committee of the Red Cross are programs designed for protection of human life and property. Those programs teach about hazards, disasters and emergency management.

In Turkey, courses focusing on protection of life and property during natural hazards are not given at schools. Nevertheless, in Turkey, the domain of protection from natural disasters is controlled by several institutions and organizations related to disaster management. These contain major departments of protection, which are run by the Prime Ministry General Directorate of Emergency Management; governorates; metropolitan municipalities; and town, provincial and district municipalities, etc.

The concept of metaphor is a figure of speech that can be defined as transferring the unknown to the known or a vision tool that works by transferring qualities from a level of reality to another level (Mutlu, 2010: 106). As an efficient research tool, metaphor is a useful way of bringing implicit assumptions to awareness, encouraging reflection, finding contradictions and fostering change in educational beliefs and practice (Cameron, 2003). A metaphor is not a figure of speech but a mode of thought, so it characterizes thinking.

The basic principle of education is providing known information to replace unknown information and making the intangible palpable. In such, metaphors are used to describe intangible information by using palpable information. Metaphors are very important to understand how people describe the world and themselves.

Metaphors can be used in many fields of education

(Table 1).

The "flood" metaphor was given to 9th, 10th, 11th and 12th grade class students in the form of a questionnaire. The importance of this project is its uniqueness in Turkey and the rest of the world. The study will help us to understand how natural hazards are realized by people and reflects how natural hazards have been taught in schools. Additionally, those who considered metaphors as important reported that the process of writing and reflecting deepened their understanding of why and how they wanted to teach. Also, metaphors guide people on how social interactions can be increased and how they should be organized (Boroditsky, 1999; Cerit, 2008; Kaya, 2010; Öztürk, 2007).

METHODOLOGY

The research was conducted using a content analysis technique, which is considered in the questionnaire method. The purpose of content analysis is to teach the concepts and relationships that explain the collected data. In such, the provided data will guide us in interpreting the conclusions and suggestions, even assisting in drawing comparisons between metaphors.

This study was done among 413 high school students that are at the 9th, 10th, 11th and 12th grade level in one of the private education centers in Turkey. Private education centers provide short-term courses that prepare students for various exams, including high school entrance exams and university entrance exams. Every student in Turkey has to take nationwide entrance exams at the end of their primary and secondary education in order to enter a good high school or a university. Private courses last for a year and help the students who want to prepare for these exams in the last year of their primary or secondary education to do so.

The questionnaire paper did not include any private information except class and gender status. 195 (47.21%) out of 413 students were males, and 218 (52.78%) out of 413 students were females. The concept of "flood" was investigated in the research and we wanted to ascertain what "flood" means to the students in their own perspectives, including metaphorically. The metaphor used was "Flood is like......; because...............". Analysis of the metaphors is developed by processes such as defining the study group, reading and coding metaphors, classifying metaphors into the groups, categorizing development of metaphors, validating metaphors and transferring metaphors to the computer. All those steps are used one-by-one to develop, interpret and validate metaphors. The main point of those processes is to bring similar data together and divide between groups.

Reading and coding metaphors

In order to ascertain the perception of the students regarding the concept and metaphorical implication of "flood", the following statement was used: "Flood is like......; because...............". There was only one question and students were not allowed to write their personal information. There was no time limitation to write their ideas about the "flood" concept; students were able to write their thoughts only on one piece of paper by thinking about the metaphor. Each class had approximately 13 students and the study was applied to 24 classes, which included students from all grades (9th, 10th, 11th and 12th grade classes). For the process of coding metaphors, each student's metaphor was prepared according to the alphabetical order to find similar metaphors and place them together in the same metaphor category. Significantly closer

Table 1. Geography class educational program, 10th grade.

Learning area: Environment and Society	
Attainments	**Activity examples**
D.10.3. In term of development of disaster awareness, the student evaluates the impact of people on the formation of natural disasters.	Understanding nature in the right way. There could be a brainstorming session about the reduction of natural disaster damage such as damage associated with flood, wind and earthquakes.

Resource: MEB: 2011.

metaphors are classified as one category. Statements without metaphors are not categorized and are cancelled.

At the end of category development of metaphors, 10 parts were chosen for categorization using metaphor analysis. They were examined to ascertain the similarities or common features with other metaphors. The target metaphors written by students were checked one after the other and (1) the topic of the metaphor, (2) the source of metaphor and (3) the connection between the topic of metaphor and (4) the source of the metaphor were analyzed. The relationship between the metaphor and its subject is classified to similar meaning categories; for example, "Flood, as a scary and terrifying event because it seems as a cliff" was placed in the same category as "Flood, as a scary and terrifying event because it seems as a doomsday". However, metaphors without a subject or a subject without a metaphor are eliminated. For instance, "Flood is like a footballer, because...... ." Those statements without metaphors are cancelled.

Validity and reliability are the key factors of the study; they provide the preciseness of the thesis. There are 10 conceptual categories that occur in the study to provide and support the validity and reliability of the study under these circumstances. Concepts and metaphors are placed in lists. The lists cover samples of metaphors and the names and features of conceptual categories. The first list has 413 metaphors and they are in alphabetical order. The other list contains the names and features of 11 conceptual categories. No metaphor is left in the list; each metaphor is included into one category and the sample metaphor is placed in the 10 conceptual categories. Then, the categories made by the expert were compared with the ones made by the researcher. In the comparisons, the reliability of the research was calculated to determine the number of common points and differences using Miles and Huberman's (1994) formula (Reliability = Consensus/ Consensus + dissidence). In this kind of qualitative research, the quality level is ensured in any cases for which the suitability between the reviews of experts and researchers is over 90%.

FINDINGS

In the findings, the researcher examined and interpreted the study by classifying and categorising metaphors within the research questions. The high school students produced 413 valid mental images to represent the concept of "flood". All concepts are accepted and matched to the metaphor category. Those concepts are; "A Friend of the angel of death, A wild snake, Anger, Cave, Cliff, Competition, Dispair, Doomsday, Drowned, Elder brother, Faith, Father, Fight, Mother, Getting low grade, Ghost, Having a tooth out, Homeless, Horror movie, Hunter, Loan Shark, Loosing Humanity, Marsh, Matehmatic, Nightmare, Regret, Scary, school, Sea, Selfish person, Steep Slope, Space, Stick to life, Stoping the life, Stoping the time, Sun, Surprise, The angel of death, University entrance exam, Weapon of rain, Affect our life, Destruction, Earthquake, Flood, Flow, Happens by itself, Heavy rain, Hide, Inundation, Natural hazard, Catastrophe, Dream, Implacability, Loss, Porcelain tea set, Trouble, Discharge, Ice, Inception, Includes waves, Interaction, Landmass, Lightning, Mud, Natural event, Power-Enthusiasm, Puddle, Saturation, Tsunami, Urban sprawl, Water, Water mass, Wind, Chaos, Disease, Enemy, Epidemic, Fire, Harm, Rock, Smoke, Storm, The Terminator, The wrath of god, Thief, War, Wave, Calm people, Dear, Ego, Enthusiasm, Faults, Flow of life, Freedom, Human, Loneliness, Male, Misslead, Patience, Questions, Suffering, Tears, Useful People, Death, Death Machine, End, Killer, Lack of oxygen, Murder, Serial Killer, A vacuum cleaner, Airscrew, Alteration, Broom, Cleaner, Cover, Eraser, Flash Flood, Lively, Multiplication, Nail Scissors, Pollution, Raider, River, Shock Wave, Sorrow, Spike, Throat, Time, Alibeyköy, Anatolian, Breath, Depressed, Desperate, ıstanbul, Ignorance, Japan, Kızılırmak, Life, Mind, Philosophy, Poison, Praise of the Faults, Respected Event, Revenge, Rise, Social Solidarity, Story, Treasure, Understanding the Nature, Bird, Crying, Knowledge, Lantern, Message, Night, Traffic Accident, Uncertainty, and Uncontrollable Power. The most preferred images are Catastrophe (f=51), Death (f=25), Water (f=14), Heavy rain (f=12), Natural hazard (f=12), Flood (f=11), Inundation (f=11), Dear (f=10), Water mass (f=9), Earthquake (f=9), Beast (f=9).

To determine the category of metaphor, the researcher created 10 categories (Table 2), and each metaphor was included into one conceptual category (Table 3). Within context of reliability, the researcher combined synonymous metaphors into one category, such as "A Friend of the angel of death, the angel of death or the grim reaper". The first category includes 79 metaphors; for example, Anger (3), Beast (9), Car (4), Cave (1), Cliff (2) and others. The second category is "Flood, as a natural hazard", which includes 67 metaphors; for example, Destruction, Earthquake, Flood, Flow, Heavy rain and Inundation. The third category is "Flood, as an event causing life and property loss" and this one contains 57 metaphors. "Flood, as a natural event" has 44 metaphors. 36 metaphors are collected into the category of "Flood, as a burning and destroying event". The 6th category is "Flood, as an event altering the human psychological state" and includes 34 metaphors. The 7th category includes 30 metaphors in "Flood, as a way of

Table 2. The categories of metaphors produced by high school students.

Order	Categories	Frequency	Percentage
1	Flood, as a scary and teriffying event	80	19.28
2	Flood, as a natural hazard	67	16.14
3	Flood, as an event causing life and property loss	57	13.73
4	Flood, as a natural event	44	10.6
5	Flood, as a burning and destroying event	35	8.47
6	Flood, as an event altering the human psychological state	35	8.47
7	Flood, as a way of expressing death	30	7.22
8	Flood, as an event wiping away everything	27	6.53
9	Flood, as a prudent event	27	6.53
10	Flood, as an unpredictable event	11	2.65
Total	Accepted Concepts (out of 10 categories)	413	100

expressing death". "Flood, as an event wiping away everything" included 27 metaphors. "Flood, as a prudent event" has 27 metaphors. The last category includes 11 metaphors in "Flood, as an unpredictable event". All categories are created according to the properties of the metaphors.

Categories

First category, "Flood, as a scary and teriffying event"

There are 41 (9.92%) different metaphors included into the first category and they were chosen by 80 (19.28%) high school students. Those metaphors are: A Friend of the angel of death (1), A wild snake (1), Anger(3), Cave (1), Cliff (2), Competition (1), Elder brother (2), Faith (1), Father (1), Fight (1), Mother (2), Getting a low grade (1), Ghost (1), Having a tooth out (1), Homeless (2), Horror movie (1), Hunter (1), Loan Shark (1), Loosing Humanity (1), Mathematic (2), Regret (1), Scary (2), School (1), Sea (2), Selfish person (1), Steep Slope (1), Space (1), Stick to life (1), Stoping the life (3), Stoping the time (1), Sun (1), Surprise (1), The angel of death (3), University entrance exam (1), and Weapon of rain (1). When we investigate the distrubution of metaphors in the category, frequent ones occour: Beast (9), Dispair (5), Doomsday (5), Nightmare (5), Car (4) and Drowned (3). The following were the examples given by the students in this category:

"A flood is like a beast, because it destroys everything",
"A flood is like a loan shark, because it eats everything".

Second category, "Flood, as a natural hazard"

There are 10 (2.42%) different methapors included in this conceptual category. These metaphors were produced by 67 (16.14%) high school students. Contained metaphors are: Affects our life (1), Destruction (2), Earthquake (9), Flow (2), Happens by itself (1), and Hide (1). The most-used metaphors are Heavy rain (12), Inundation (12), Flood (11) and Natural hazard (11). Examples of methapors:

"A flood is like a heavy rain, because it takes too much water with it".
"A flood is like a flow, because it brings trouble".

Third category, "Flood, as an event causing life and property loss"

There are 6 (1.45%) different metaphors in this conceptual category. These metaphors were mentioned by 57 (13.73%) high school students. The distribution of metaphors in this category was examined and frequency of use was: Catastrophe (51), Dream (1), Implacability (1), Loss (2), Porcelain tea set (1) and Trouble (1). The most frequent one is Catastrophe (51). Examples of metaphors:

"Flood is like an implacability, because it does not have mercy, we lose everything".
"Flood is like a loss, because it causes life and property loss".

Fourth category, "Flood, as a natural event"

When we examine this category, there are 17 (4.11%) different metaphors. These metaphors were produced by 44 (10.6%) high school students. Those metaphors are Discharge (1), Ice (1), Inception (1), Includes waves (1), Interaction (1), Landmass (1), Lightning (1), Mud (1), Natural event (2), Power-enthusiasm (1), Puddle (1), Saturation (1), Tsunami (3), Urban sprawl (1) and Wind (1). The most-used ones are Water (14), and Water mass

Table 3. Valid metaphors given by high school students about the concept of "Flood".

Order	Metaphors	Frequency	Percentage	Order	Metaphors	Frequency	Percentage
1	Catastrophe	51	12.34	16	Dispair	5	1.21
2	Death	25	6.05	17	Doomsday	5	1.21
3	Water	14	3.38	18	Life	5	1.21
4	Heavy rain	12	2.90	19	Nightmare	5	1.21
5	Natural hazard	12	2.90	20	Car	4	0.96
6	Flood	11	2.66	21	Enemy	4	0.96
7	Inundation	11	2.66	22	Killer	4	0.96
8	Darling	10	2.42	23	Anger	3	0.72
9	Beast	9	2.17	24	Disease	3	0.72
10	Earthquake	9	2.17	25	Drowned	3	0.72
11	Water mass	9	2.17	26	Enthusiasm	3	0.72
12	Cleaner	7	1.69	27	Eraser	3	0.72
13	Tears	7	1.69	28	Message	3	0.72
14	Harm	6	1.45	29	The angel of death	3	0.72
15	War	6	1.45	30	Tsunami	3	0.72
31	Cliff	2	0.48	43	Revenge	2	0.48
32	Competition	2	0.48	44	River	2	0.48
33	Destruction	2	0.48	45	Rise	2	0.48
34	Elder brother	2	0.48	46	Scary	2	0.48
35	Fire	2	0.48	47	Sea	2	0.48
36	Fundamental	2	0.48	48	Smoke	2	0.48
37	Homeless	2	0.48	49	Stop the life	2	0.48
38	Human	2	0.48	50	The wrath of god	2	0.48
39	Loneliness	2	0.48	51	Thief	2	0.48
40	Loss	2	0.48	52	Time	2	0.48
41	Mathematics	2	0.48	53	Urban sprawl	2	0.48
42	Natural event	2	0.48	54	Misslead, poison, shock wave, wind, landmass, ignorance, murder, ghost, mud, horror movie, the terminator, loan shark, etc.	1	0.24
43	Total valid metaphors	413	100,00				

(10). Examples of Metaphors:

"Flood is like a landmass, because its intensity gets bigger".
"Flood is like water, because it flows very fast".

Fifth category, "Flood, as a burning and destroying event"

There are 14 (3.38%) different metaphors in the conceptual category of "Flood, as a burning and

destroying event". These metaphors were produced by 35 (8.43%) high school students. The most frequent metaphors are War (6), Harm (6) and Enemy (4). Other metaphors are Chaos (3), Disease (3), Epidemic (1), Fire (2), Rock (1),

Smoke (2), Storm (1), The wrath of god (2), Thief (2), Wave (1) and The Terminator (1). Examples for this category are including;

"Flood is like a disease, because it is wide-spread".
"Flood is like a war, because it destroys the environment".

Sixth category, "Flood, as an event altering the human psychological state"

"Flood, as an event altering the human psychological state" category contains 16 (3.87%) different metaphors. 35 (8.67%) high school students in the the study chose responses fitting into this category: "Calm people (1), Ego (1), Enthusiasm (2), Faults (1), Flow of life (1), Freedom (1), Human (2), Loneliness (2), Male (1), Misslead (1), Patience (1), Questions (1), Suffering (1) and Useful People (1). Nonetheless, the most frequent metaphors were Darling (10) and Tears (7)". Examples of Metaphors:

"Flood is like a tear, because it leaves nothing but harm".
"Flood is like a darling, because it always ruins your life".

Seventh category, "Flood, as a way of expressing death"

"Flood, as a way of expressing death" category contains 8 (1.93%) different metaphors. 30 (7.22%) high school students in the the study submitted these metaphors: Death Machine (1), End (1), Killer (4), Lack of oxygen (1), Murder (1) and Serial Killer (1). The most-used metaphor in this category is Death (21). Examples of Metaphors:

"Flood is like the lack of oxygen, because it drowns people"
"Flood is like death, because it kills living things".

Eighth category, "Flood, as an event wiping away everything"

The "Flood, as an event wiping away everything" category has 19 (4,60) different metaphors. In such, 28 (6.74%) high school students produced these metaphors: A vacuum cleaner (1), Airscrew (1), Alteration (1), Broom (1), Cover (1), Eraser (3), Flash Flood (1), Lively (1), Multiplication (1), Nail Scissors (1), Pollution (1), Raider (1), River (2), Shock Wave (1), Sorrow (1), Spike (1), Throat (1) and Time (2). The most frequant metaphor is Cleaner (6). Examples of Metaphors:

"Flood is like a cleaner, because it swallows everything".
"Flood is like an eraser because it wipes away everything where it goes".

Ninth category, "Flood, as a prudent event"

In this category, there are 21 (5.08%) different metaphors. These metaphors were produced by 27 (6.5%) high school students. The most frequent metaphors are Life (5), Revenge (2), and Rise (2). Other metaphors are "Alibeyköy (1), Anatolian (1), Breath (1), Depressed (1), Desperate (1), Istanbul (1), Ignorance (1), Japan (1), Kızılırmak (1), Mind (1), Philosophy (1), Poison (1), Praise of the Faults (1), Respected Event (1), Social Solidarity (1), Story (1), Treasure (1) and Understanding Nature (1). Examples of Metaphors:

"Flood is like life, because it teaches us how to survive".
"Flood is like Istanbul, because it happens in Istanbul every year".

Tenth category, "Flood, as an unpredictable event"

When we examine the last category, there are 9 (2.17%) different metaphors. These metaphors were chosen by 11 (2.65%) high school students. All metaphors about a "Flood, as an unpredictable event" are: Bird (1), Crying (1), Knowledge (1), Lantern (1), Night (1), Traffic Accident (1), Uncertainty (1) and Uncontrollable Power (1). The most repeated metaphor in this section is Message (3). Examples of Metaphors:

"Flood is like a message, because it is not certan that you will recieve it".
"Flood is like a traffic accident, because it can be happen anytime.

DISCUSSION AND CONCLUSION

This study is based on the use of quantitative research methods to examine metaphors about "flood" produced by high school students. The metaphors show how high school students approach the concept of "flood" concept and the classification of their thoughts into groups. All metaphors are classified by their features. The research pointed toward many significant ideas, and a great number of students have a bad image about the concept of "flood". Based on these findings, is shown that many students see a "flood, as a scary and terrifying event". These kinds of concepts show that students reflect their experiences in their choice of metaphors.

   A metaphor is a figure of speech that describes one thing as something else. As Yob (2003) stated, a metaphor is not the case it mentions; rather, it is only an image. If it were the case, metaphor would not be required. Therefore, metaphor is different from the case, although it provides a very strong perspective related to the case. To compensate for this situation, there must be a lot of metaphors (Saban et al., 2006: 504; Saban, 2009:

307). Some of the factors that determine the metaphor of "flood" chosen by the students include students': experiments, attitude, education level, living conditions, environmental conditions, teacher qualifications, interests, media and other psychological factors.

This research focused on 10 existing metaphor categories. There are many metaphors derived under these categories. It can be seen that "Flood, as a scary and terrifying event" (f=80) category had the most frequency of metaphors. This result illustrates that a great number of students think that "flood" is a scary concept. The second most-rated category is "Flood, as a natural hazard" (f=67), which is interpreted as the threat of a naturally occurring event that will have a negative effect on people or the environment. Number three is "Flood, as an event causing life and property loss" (f=57) category; most students think that "flood" causes damage to public or private property. "Flood, as a natural event" (f=44) category comes in at fourth place. This category regarded flood as a phenomenon that occurs outside of human control. The category "Flood, as a burning and destroying event" (f=35) is about "flood" as a disaster generally caused due to the imbalance in nature and one that generally causes great harm to the area in which it occurs. "Flood, as an event altering the human psychological state" (f=35) reminds students of a social change that is radical and rapid in character, with highly magical explanations by victims and others. "Flood, as a way of expressing death" (f=30), created a bad image in students' mind, which reminds students that it is not only a physical event; rather, "flood" also brings annihilation with it. "Flood, as an event wiping away everything" (f=27) is a category derived because "flood" is a powerful event; it brings high mass of water and forces materials to move from one place to another. "Flood, as a prudent event" (f=27) reminds students of old memories or experiences they had lived through before. "Flood, as an unpredictable event" (f=11) shows students' approach this concept as an event that cannot be foreseen.

To sum up, the study shows us how high school students approach the concept of "flood" and what they know about it. Teachers or students can improve their knowledge or skills by using metaphors and the classes, schedules, activities or educational materials can be set according to these scientific findings.

REFERENCES

Boroditsky L (1999). Metaphoric structuring: understanding time through spatial metaphors. Cognition 75:1-28.

Cerit Y (2008). Öğretmen kavramı ile ilgili metaforlara ilişkin öğrenci, öğretmen ve yöneticilerin görüşleri. Turk. Educ. Sci. J. 6(4):693-712.

Curry RR (1972). Rivers a geomorphic and chemical overview, pp.9-31. In River Ecology and Man (Eds: Oglesby RT, Carlson CA & McCann JA), Academic Press, New York, pp. 9-31.

Getis A, Getis J, Fellmann JD (2008). Introduction to Geography, NewYork, McGraw Hill.

Kaya H (2010). Metaphors developed by secondary school students towards "earthquake" concept. Educ. Res. Rev. 5(11):712-718.

MEB (2011). T.C. Millî eğitim bakanlığı talim ve terbiye kurulu başkanlığı. Coğrafya dersi öğretim programı (9, 10, 11 ve 12. sınıflar). Ankara. MEB Publication.

Mutlu D (2010). Farklı Dikkat Türlerine Göre Hazırlanmış Çoklu Ortam Öğretim Tasarımlarının Farklı Kısa Süreli Bellek Kapasitesine Sahip Öğrenenlerin Geri Getirme Performanslarına Etkisi. Hacettepe Üniversitesi. Fen Bilimleri Enstitüsü. (Unpublished Master's Thesis).

Öztürk Ç (2007). Sosyal bilgiler, sınıf ve fen bilgisi öğretmen adaylarının 'coğrafya' kavramına yönelik metafor durumları. Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi [Ahi Ev. Univ. Kırş. Educ. Fac. J. 8(2):55-69.

Proff NL, Allan JD, Bain MB, Karr JR, Prestegaard KL, Richter BD, Sparks RE, Stromberg JC (1997). BioScience, 47(11):769-784.

Saban A (2009). Mental Images of Teacher Candidates towards "student" concept. Turk. Educ. Sci. J. 7(2):281-326.

Saban A, Koçbeker BN, Saban A (2006). Examining of teacher candidates' perceptions towards "teacher" concept through metaphor analysis. Educ. Sci. Theory Prac. 6(2):461-522.

Yob IM (2003). "Thinking Constructively With Metaphors. Stud. Philo. Educ. 22:127-138.