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"Mind Maps" in the Metaphors of Geography Teacher Candidates

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ABSTRACT

The purpose of this study is to reveal geography teacher candidates' perceptions related to "mind maps used in Climatology course" via metaphors. The study has been conducted in Trabzon, TURKEY. The study group consists of 32 first-grade teacher candidates studying at Department of Geography Teaching, Fatih Education Faculty in the spring semester of 2010-2011 academic year. In order for the data collection, metaphor technique has been used. Each teacher candidate participating in the research has been asked to associate "mind maps used in Climatology course" with something and to explain the reasons of their associating. After analyzing the data, the metaphors students created have been gathered under five main categories. These categories, according to their percentages, are (from higher percentage to lower percentage): instructive, improving high-level thinking skills, entertaining, visual and subjective. Those which stress on the "instructive" side of the technique are formed of sub-categories as "summarizing, permanent and guiding". The sub-categories of the main category "improves high-level thinking skills" are formed of "adjusting the associations, imagination, questioning skills". As a result of the research, the technique has been found instructive and effective in terms of questioning, imagination, showing the associations. Also the technique's being entertaining, appealing to the eye, reflecting the individual subjectively are among the results of the research.

Keywords:
Geography Education, Climatology, Metaphor Technique, Mind Map, Teacher Candidate

Introduction

The current understanding of education has adopted an approach based on the individual differences and using assorted materials effectively in the education process. Thus, this approach is based on the understanding of retentive learning, and considering learners having different kind of intelligence and different kind of learning in the education process. In this context, using tools and materials addressing mainly to the senses is one of the pre-conditions in order to realize the targeted learning. A variety of maps, diagrams, photographs and technological tools are a necessity in today's educational activities. Among these aforementioned materials, there are also mind maps developed by Tony Buzan. When literature review is conducted in the relevant area, it is seen to be used terms such as "memory map, intelligence map, brain map, meaning map and idea map" in return of the search for the term "mind map" (Aydin, 2010: 3). These maps enabling the infromation more understandable and more visible are among the significant learning tools. In addition, background knowledge of the learners is of reasonable importance in the constructivist approach. For this reason, this technique could be used in order to determine deficiencies in the background knowledge of the students. Besides, mind maps could be applied in order to analyze the processes of the learner's structuring the knowledge (Evrekli ve Balim, 2010: 78). Buzan (1993) defines the mind map as a

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visual note taking technique enabling the individuals to learn by providing the organization of the knowledge and also increasing their creativity. In other words, mind maps are a way of organizing the ideas with key words and pictures, a technique of summarizing the sets of information on a sheet of paper and also materials used as a tool for remembering (Nast, 2006; cited Aydın, 2010: 3). Using key words and symbols related to subject simplifies the relevant sub-concepts to be remembered (Çamlı Çakır ve Altun, 2011). Organized knowledge classified and associated with each other is better understood and remembered when compared to disorganized and mixed knowledge (Açıkgöz, 2006: 113). Based on this fact, mind maps enable brain to take action analytically and spatially. Accordingly, these are the reflections of the relations between concepts and ideas in the mind. Indeed, mind maps are a sort of fast and economical note taking technique. They provide a wholistic and segmental look at the relations between concepts and events. They also help in the development of high order thinking skills such as analysis, synthesis. According to Saban (2005:118), mind maps are similar to geographical maps in one aspect. These are the visualized forms of mental models related to particular subjects, cases or problems in the minds of the students. In short, these maps reveal out the cause-result relations among events or concepts in a practical and economical way. Mind maps could also be used in different steps of teaching process. Illustrations, diagrams and drawings are effective on the permanence of the learning. With reference to a saying that a picture is more effective than a thousand words, this technique can support various intelligence areas. Another advantage of this technique is that the students focus on the features of the relations among the concepts. Those feeling themselves insufficient about this issue observe how they learn the concept and make plans for learning this concept (Butuner, 2006: 20). Mind maps differ from concept maps with the features as there is no compulsory for the concepts to be arranged in a hierarchical structure, mind maps include various images and figures, there is used different colors in mind maps and the links among the concepts show similar folds to the nerves in the human mind (Yavas, 2011: 25).

It is necessary to enable the brain consisting of two parts with different functions to operate as a whole. For this, the techniques activating the both spheres are needed. Mind map is a technique enabling left side of the brain being responsible for logic, vocabulary, arithmetic, linearity, queues, lists, and analysis, and the right side of the brain responsible for spatial awareness, imagination, emotion, color, rhythm, shapes, geometry, synthesis (Buzan, 1976, cited. Butuner, 2007: 2). On the other hand, Butuner (2007) lists the benefits of the mind maps as follows: Organizing the information, helping about the repetition and the summary, associating the old and new knowledge, teaching new concepts, revealing out the cognitive structures of the students, providing awareness of the information organization for the student, developing exploration and creativity with misassociations… etc. In short, these maps are a graphical display of complex information and "a thinking strategy" increasing creativity and remembering.

English psycholog, mathematician and brain researcher, Buzan (1996), developing the mind mapping technique lists the four fundamental features of mind maps as:

1) Attention to the subject is provided with a picture in the center of the mind map.

2) The main themes of the subject are created by the branches associated with the image in the centre.

3) The branches refer to the key image or key word on the combined lines.

4) The branches have a structure related to each other (cited. Gür and Bütüner, 2006: 63).

"A paper, colored pencils and imagination" can be said to be enough for drawing mind maps (Buzan, 2002). Gelb (1995) briefly necessitates paying attention to the following points in the process of drawing mind maps: the mind map is started with a symbol or a image drawn in the centre of a paper. Key words are used. Key words are connected to the central image with the arrows. The key words used in every line are emphasized. For a better stress, colors, images, dimensions and codes are utilized. This technique, indeed, can be regarded as the original reflection of what is in the individual's mind. The individual creativity forms the basis; however, how the individual structures the information must be taken in consideration (Yaşar, 2006: 4). Within this context, it is possible to state that mind mapping technique can support the constructivist approach.

The mind mapping technique, which was mostly inspired from the geniuses' note taking technique, is used in note taking, teaching and evaluation during the courses, and in forming the meeting plans in

business world. Nevertheless, this techniques is not used at a sufficient level in our country (Balım et al., 2006-a: 7). Whereas it is a truth that these maps can have an effect on the development of geographical understanding. However different are they from the classical maps in terms of their structures, American National Geography Standards (Geography For Life, 1994), students completing their high school education must acquire the following skills in relation to the mind maps (Taş, 2003: 11): a) being able to use the mind maps to answer the geography questions… b) being able to determine the ways affecting the decisions about the position and settlement of a place… c) being able to compare the individuals' mind maps in order to reveal the factors affecting the spatial perception the development of preferences… The geography course- often regarded as being composed of information stack and memorization- can be put into a more activity-based and participatory process. Students' geographical knowledge and skills can be enriched, too.

It is possible to say there has been an increase in the number of academic studies towards mind mapping techniques recently. Here are some of the studies that took the aforesaid technique as their subject matter: Aydın's (and et al) (2007) "the theory of multiple intelligence and the use of mind maps in science teaching", Kartal's (2011) "The effect of mind mapping technique on students' achievements, attitudes and their retention level in social studies course, Şeyihoğlu and Kartal's (2010) "the teachers' views towards mind mapping technique in primary education constructivist approach-based social studies course", Bütüner and Gür's (2008) "teaching angles and triangles by means of the meaningful learning tools such as v diagrams and mind maps", Elgin Kıdık's (2005) "the application of the constructivist teaching method- developed by use of mind mapping technique- in the unit 'living beings are diversified' and its comparison with the traditional method", Evrekli's (2010) "the effect of mind map and concept cartoon on students' academic success and their perception of inquiry-based learning skill", Karataş's (2010) "the analysis of mind maps of candidate teachers for the computer and instructional technologies course in relation to their profession (A sample of Gazi University)", Balım et al. (2006-b) "The significance of mind maps and concept cartoons use in teaching of science and technology", Evrekli et al. (2009) "mind mapping applications in special teaching methods courses for sciences teacher candidates and teacher candidates'' opinions concerning the applications", Çamlı's (2009) "the effect of computer-based mind mapping technique on primary education 5th graders' academich success and their attitudes towards science and computer", Aydın's (2009) "the effect of mind mapping technique on understanding what is listened", Tunçel's (2002) "the Islamic countries in Turkish students' mind maps", and etc. Some other studies in the international arena towards mind mapping technique belong to the following researchers: Buzan and Buzan (1993), Buzan (2008), Buzan (2009), Al-Jarf (2009), Bennett and Rolheiser (2001), Budd (2004), Chan (2004), Davies (2010), Eppler (2006), Goodnough and Woods (2002), Moi and Lian (2007), Mento et al. (1999), Wickramasinghe et al. (2008), Gibson and Zellmer-Bruhn (2001).

Through most of these academic studies, some of which were mentioned above, the effect of mind maps on the academic success was tested. In some of these studies the views towards this technique (mind mapping) were taken. However; when the literature related to the subject is reviewed, one can see that the technique has not been investigated thoroughly. Therefore, our study is thought to contribute to this area. In this regard, one of the points that brings our study into prominence is the fact that students' views towards this technique are received through metaphors. Besides, the fact that this technique is employed in a course (Climatology-II) during an academic term, and that following this long process, the students' opinions are determined are of great importance. Moreover, metaphors' being regarded as strong mind mapping and modeling mechanisms towards individuals' understanding and structuring their own worlds (Aslan and Bayrakçı: 2006: 103), points out the significance of relation between mind mapping technique and the metaphor.

"Metaphor" is of Greek origin and thought to be derived from word *metafora* that means "carry or transfer" (Rızvanoğlu, 2007: 6). Metaphor is a figure of speech that explains a concept by comparing it with another concept. In other words, it is an approach that aims at obtaining more knowledge about the features of an unfamiliar concept by comparing it with a familiar concept the features of which are well known. Palmer and Lundberg (1995) describe the metaphor as a way of expressing an idea, an object or an action through a familiarity with a different idea, object or action (cited Tamimi, 2005: 30). It is a tool giving an idea about how people perceive the life, the environment, the events, and the objects (Cerit, 2008: 694). According to Balcı (1999), metaphors present deeper meanings rather than the surface meanings. They are also

important because of the fact that they speed up our process of attaching a meaning to the abstract concepts through concretization.

Metaphors do not only contribute to building the reality but also to how the reality should be perceived. They can be used to understand a new phenomenon, and simplify learning information about it (Alpaslan, 2007: 34). The metaphors that have risen in importance recently appear as a kind of data collection tool. Here are some of the studies on metaphors in our country: Saban (2004 and 2009), Saban et al. (2006), Semerci (2007), Beşkardes and Günay (2007), Merdivan (2007), Girmen (2007), Karadaş (2007), Evcim (2008), Aydoğdu (2008), and Dönmez (2008). Besides, the studies on metaphors and aiming to identify students' perceptions towards geography or a geographical phenomenon or a concept are attracting great attention. Öztürk's (2007), "Social Studies, Classroom, and Science candidate teachers' metaphors towards geography concept", Aydın's (2010), "Secondary education students' metaphors towards geography concept", Geçit and Gençer's (2010), "Identifying classroom teaching 1st grade students' perceptions of geography through metaphors (A sample of Rize University)" Coşkun's (2010), "High school students' metaphors towards climate concept according to gender variable", Aydın and Ünaldı's (2010) "The analysis of geography teacher candidates' perceptions towards geography concept with the help of metaphors", Kaya's (2010), "Metaphors developed by secondary school students towards earthquake concept", Şeyihoğlu and Gencer's (2011) "The use of metaphor technique in teaching of Social Studies" can be given as examples. The studies that were conducted in relation with metaphors in other countries belong to the following researchers: Lakoff and Johnson (1980), Morgan (1983), Ponterotto (1994), Goatly (1997), Kovecses (2002), Littlemore (2002), Littlemore (2004), Henze (2005), Stutzle and Sajaniemi (2005), Levine (2005), Charmé, and Horowıtz (2008), Shaw et al. (2008), Yang et al. (2009), Sznajder (2010).

Problem Statement

The problem statement subjected to the research: What are the metaphors of the geography teacher candidates related to mind mapping technique in Climatology course?

Method

Due to the nature of research problem, phenomology, one of the qualitative researches, was used in this study carrying qualitative features. Phenomology focuses on phenomenons having noticable design but no detailed insights. Even though we come up with the phenomenons in daily life, this does not mean we understand them exactly. For the studies aiming to research the phenomenons that are somewhat familiar to people but at the same time their exact meaning could not be fully comprehended, phenomology forms a good basis for research (Yıldırım ve Şimşek, 2005).

Study Group

The study was conducted at the department of Geography Teaching in the Fatih Education Faculty of Karadeniz Technical University in Trabzon Province in Turkey during 2010-2011 academic year. The study group consisted of 32 first-grade teacher candidates. They were 7 females and 25 males.

Data Collection

The application was carried out by one of the researchers personally in the spring term of 2010-2011 academic year. It lasted for 14 weeks in the context of "Climatology II" course which had 4 theoritical course credits. In the course of first two weeks, the course was performed based on the mind maps developed by the researchers. During later 12 weeks, teacher candidates were required to transfer what they had learned to their own mind maps at the end of every week. In the 14th week, the teacher candidates were given a lecture about metaphor technique, and the examples were demonstrated during one course hour. The teacher candidates were asked to form metaphors in relation to the mind maps they constructed in the "Climatology II" course. For this practice, the teacher candidates were given one course hour. They were

demanded to assimilate their mind maps to some things, and explain the reason for their assimilation (e.g : mind maps resembles….Because....). The teacher candidates were advised to pay attention to form "origin, target, and the relation from origin to target" wholesomely while structuring metaphors. Besides, they were briefly informed about the importance of their not being affected from one another, and advised to be away from evaluation anxiety. These metaphors formed by the students constituted the basic source for data collection.

Data Analysis and Interpretation

The descriptive analysis techniques were employed in the data analysis of the research. During the analysis and the interpretation of the practices, utilizing the study by Saban, Koçbeker & Saban (2006), the following stages were followed.

1-Naming Stage: At this stage, the teacher candidates' ability to make meaningful metaphors and sentences, and the legibility of their handwriting were taken into consideration. Which student formed which metaphor was temporarily noted as a preparation for classification. The paper which included irrelevant attribution to metaphor was marked.

2-Elemination Stage: The paper marked before was reviewed. A paper that did not include a valid metaphor; namely, paper that did not cover the target, the orgin, or the components of a relation from origin to target was excluded from the study.

3-Developing Category: the categories towards the features on which the generated metaphors based were developed at this stage. The aspects of mind maps being instructive, developing high level thinking skills, being visual, enjoyable, and subjective became the subject matter of the categories. Also sub-categories were developed within some main categories.

4-Satege of ensuring the validity and reliability: in order to secure the reliability of the study, the expert's views were referred to confirm whether metaphor images presented in 5 main categories represented the mentioned conceptual category. Apart from that the categories built by the researchers at independent times were compared, and 78% of an agreement (reliability) was obtained. The categories on which there were splits in opinions were discussed, and finally consensus was achieved. Another component enhancing the reliability of the study was the fact that the study was carried out in one of the researchers' own course. Also students' views were often quoted in order to improve the internal reliability and validity of the study.

5- Stage of Interpretation based on the generated metaphors: after the categories were developed, they were transferred to tables. Their use frequency among the teacher candidates were calculated in percentages and frequencies. Every metaphor was exactly noted. Then they were interpreted.

Findings

In accordance with the research problem statement, finding in relation to the metaphors belonging to the geography teacher candidates towards mind map method are as in Table 1.

As seen in Table 1, geography teacher candidates' perceptions towards mind maps used in "Climatology II" course were categorized through metaphors. The candidate teachers' statements which determined the formation of the categories were also presented in the table.

The main categories established via the analysis of candidate teachers' metaphors were 'It develops high level thinking skills,' and 'It's instructive'. Main categories were composed of sub-categories. The sub-categories below the main category 'It's instructive' were 'It summarizes', 'It enables retention', and 'It guides'. Sub-categories under the main category 'It developes the high level thinking skills' were 'It arranges the relations', 'imagining' and 'questioning'. Apart from these main categories, 3 more independent categories which could not be combined under an upper chord came to being. These categories were 'It's enjoyable', 'It's visual', and 'It's subjective' respectively.

Table 1. The metaphors that the geography teacher candidates have towards the mind maps employed during "Climatology II" course, their categories, and the candidate teachers' statements

Categories		Metaphors	Example Sentences	N	%
It's instructive	It summarizes	• Headline • Looking through peep hole • Ink • A cup of water • Book • Dictionary	"Like a headline, it summarizes the subject" "It is like looking at the whole world through peep hole, because it is a way of reaching to the whole by means of a word" "It is like ink. Only a drop of it can cover all the water" "Being able to talk about oceans through a cup of water" "Like a book, it keeps information in itself." "Like a dictionary, it is composed of key words."	1,7,9,23,24,28	19
	It enables retention	• Rock • Long term memory • Copy • Word cards	"Like a rock, it is quite strong." "It's like a long term memory, because once you use it, you won't forget easily." "It's like a copy prepared for an exam, anyhow, it is remembered." "It's like word cards we used at primary school. It's still memorable."	18,19,25,30	13
	It guides	• Signboard • Navigation device • Museum	"It's like signboards at crossroads. Wherever you turn, you find a road. It takes from you from whole to parts." "It's like a navigation device. It enables us to find the links among the pieces of information in our memory." "It's like a museum, when if you follow the guide signs, you can find and know what is being displayed in the museum."	13,16,22	10
It develops high level thinking skills	• It associates/ arranges	• Lacework • Life • Puzzle/jigsaw • Octopus / root • Magnet • Chess • Jigsaw puzzle	"It's like my mom's lacework, because the knots are tied and the patterns come into being." "Like life, it can only be understood when everything is connected and arranged in an order." "Like a puzzle, when every picture is placed properly, the theme becomes clear." "It's like a jigsaw. Jigsaw combines colors and the shapes, while it unifies the concepts and the shapes." "It's like the arms of an octopus or the roots of a tree. We ramify the concepts. The more we ramify it, the more meaningful and better it is." "Like a magnet, it gathers all the connotations in out mind." "Like chess, every attack has its assistive and continuation."	4,14,21,26,27,29,31	23
	• Imagining	• Seeing with closed eyes • Picture/painter	"It's like seeing with closed eyes, because we envisage via imagination." "It's like a picture or a painter, because a painter combines imagination and rationality. Looking at the picture, we think and imagine."	12,15	6
	• Questioning	• Crossword • Detective	"Like a crossword, it enables us to find out all the key words." "It's like a detective, because it seeks for cause-effect relationship in everything."	8,10	6
It's enjoyable	• Game • Aquarium • Child		"It's like plying a game with my little cousin, because it is colorful and fun." "Like an aquarium, it is colorful and lively." "Mind map is comfortable and light-hearted just like a child. It requires the first thing to come mind."	2,5,18	10
It's visual	• Pictogram • Animation		"It resembles pictogram. It is not written with the letters but the pictures." "It's like an animation. Motion, colors, scripts… It appeals to different ages and different intelligence domains by use of visual intelligence."	3,17	6
It's subjective	• Mirror • Composing poem/Drawing picture		"Like a mirror, it reflects our mind." "It's like composing poem/drawing picture. In every map, I compose my poem and draw my picture."	6,11	6

When the main categories were analyzed, the mostly stressed aspect of mind maps; namely, 'It's instructive' came to the fore. 42 percent of the geography teacher candidates found mind maps 'instructive'. 19 percent of them thought that mind maps could be efficient in summarizing comprehensive and difficult subjects. A 13 percent stated that the knowledge acquired thanks to this technique used in geography teaching would be permanent. 10 percent of the candidate teachers regarded mind maps as a guide.

The main category 'It develops high level thinking skills' seemed to be the second mostly emphasized aspect of the technique after its instructive aspect. The metaphors by 35 percent of geography teacher candidates included the statements in accordance with the idea that mind maps developed high level thinking skills. These mental processes were association/arrangement, imagining, and questioning. Association and arrangement were mentioned as subject matter for the metaphors towards mind maps by 23 percent of the candidate teacher, while imagination was uttered by 6 percent of the candidate teachers. 6 percent of the candidate teachers reflected their views suggesting that mind maps required questioning skills.

Among the candidate teachers, 10 percent described the technique as enjoyable, 6 percent as visual, and another 6 percent as subjective.

Discussions, Results and Suggestions

When the metaphors used by the geography teacher candidates towards mind maps in the "Climatology II" course are analyzed, the most important of all the results is the fact that almost all the candidate teachers had positive views on the technique, because almost half of the study group regarded this technique as *instructive. Namely, the most important feature of the technique is its simplifying the learning. Moreover, another important feature of mind map is its capability of developing high level thinking skills. Other feature that was emphasized by the candidate teachers is that the process' being found enjoyable, the visual aspect of the technique and its "subjectivity" with its strength of expressing the individual.* This positive perception of the candidate teachers towards the use of mind mapping technique in geography and especially Climatology courses, which shelter numerous abstract and difficult concepts, is fairly meaningful.

The mind maps can be said to have great contributions to securing the permanent learning since they mostly make the courses enjoyable; reflect the individuals' inner worlds and knowledge; improve their high level thinking skills such as analysis and synthesis as well as their comprehension and practical skills. It is also supported by Novak and Gowin (1998) that maps, graphs, diagrams and the networks are efficient in achieving the goals related to Bloom's cognitive domain stages (cited, Gür and Bütüner, 2006: 62). The research findings show parallelism with the results of the stated studies. Findings of the research by Steyn and Boer (1998) also support the findings of the research, because in this study the efficiency of mind maps in science and mathematics courses was tested. As a result, the students stated that they enjoyed mind mapping technique; that the colored and illustrated presentations facilitated their learning and retention. The findings of the research by Farrand et al. (2002) in which students expressed that mind map technique enhanced retention level and was effectual study technique, have similarity with the findings of the research. Through quasi-experimental studies by Bütüner and Gür (2008), Evrekli and Balım (2010), Çamlı, Çakır and Altun (2011), Yavaş (2011), Kartal (2011) and Trevino (2005), the effect of mind maps on the academic achievement was tested. The results of aforesaid studies are in favor of the fact that the technique affected and contributed to the academic achievement positively. These results also support the results of our research where the technique was regarded to be instructive and improve high level thinking skills, because ensuring the permanent learning or simplifying retention is directly related to analytical and spatial functioning of the brain as a whole. Besides, the results of the studies by Virginia (1992) and Aydın (2011) discovering that students' interest towards the course increased and they found the course more enjoyable thanks to the *mind maps* have parallelism with our findings. Owing to this technique students' of different intelligence domains construct a variety of visuals and connections based on their intelligence domains and their inner worlds which makes the course more meaningful and enjoyable. As a matter of fact it is widely accepted that there is almost no room available for a form of education without fun in the understanding of the modern education. In the study by Ward and Wandersee (2002) it was discovered that the competence level of the pictures and the figures that they draw in relation to the concepts of assorted subjects was low. The researchers grounded this finding on the assumption that the mind maps were formed by the individuals' experiences and the level of motivation. The role of experiences and the level of motivation in the formation of mind maps is essentially parallel with the basic function of mind maps, and can be linked with the *subjectivity* category of our findings. Caine and Caine (2002: 98) asserted that "meaningful learning was creative, indeed" which also supports the aforesaid category. Similarly, Brinkmann's (2003) finding revealing that the use of mind maps enabled the students to set connections among the pieces of information meaningfully is in accordance with our sub-category -proposing that it *links/arrange* information- under the main category claiming *mind maps develop high level thinking skills*. The results overlaps with the findings of the studies by Kortelainen and Vanhala (2004), Cryer (2006), Mueller et al (2002), Galea and Singh (2004), Goode (2008), Tucker et al. (2010), AbiMona and AdbKhalick (2008).

In the light of findings of the study, the following suggestions are presented:

1. The lecturers are not supposed to present their own sample metaphors as it causes teacher candidates to be affected from this situation and it narrows down the horizons of their mind.
2. Teacher candidates, while creating a metaphor, are supposed to have a seating arrangement in the way that they do not influence each other.
3. The candidate teachers' views towards mind maps used during subjects of Climatology course were obtained through metaphors. Students and candidate teachers' opinions and attitudes towards these maps should also be taken through interviews and likert type scales to be developed.
4. The differentiation (depending on students' individual characteristics) of categories formed in relation with metaphor technique should be investigated.
5. It is important that the examinations causing stress on the study group throughout the term do not disrupt the practices; the students must be prevented to make mind maps with the concern of getting high marks. The study group's mind maps need to be activated in the evaluation process through the rubrics to be structured.
6. Students' sharing pretty positive opinions towards the use of mind maps in a course like Climatology which includes a lot of unfamiliar and abstract concepts points out that employing mind maps in other areas of geography at times can save the courses from being boring and abstract.
7. Mind mapping technique was not originally invented as an instructive tool, but since it was seen to be useful in the practices of learning- teaching methods (Bütüner, 2007), this technique is thought to be more effective providing that it is especially supported by the other method-techniques and instruments (particularly computed based).

Since mind mapping technique provides the opportunity of seeing both the whole and the parts of a subject as the same time; makes the concurrent use of a variety of colors, symbols and signs possible; select constructivism as the baseline; namely, serves for various domains of multiple intelligence, especially starting from primary and secondary education level, it should be enabled to be preferred in teaching of geography subjects.

References

Abi-El-Mona, I. & Adb-El-Khalick, F. (2008). The influence of mind mapping on eighth graders' science achievement. *School Science and Mathematics*, 108(7), 298312.

Açıkgöz, K.Ü. (2006). *Aktif öğrenme*. İzmir: Biliş Yayınları.

Al-Jarf, R. (2009). Enhancing freshman students' writing skills with a mind mapping software. The 5th International Scientific Conference eLearning and Software For Education, Bucharest, Romania.

Alpaslan, S. (2007). Sanayi ve bilgi toplumu yönetim metaforlarının karşılaştırılması. Yüksek Lisans Tezi, Sakarya Üniversitesi Sosyal Bilimler Enstitüsü.

Arslan, M.. & Bayrakçı, M. (2006). Metaforik düşünme ve öğrenme yaklaşımının eğitim-öğretim açısından incelenmesi. *Millî Eğitim Dergisi,* 171, 100-108.

Aydın, G., Balim, A.G. & Evrekli, E. (2007). Fen öğretiminde çoklu zekâ kuramı ve zihin haritalarının kullanımı, *Buca Eğitim Fakültesi Dergisi* 21, 74-79.

Aydın, G. (2009). Zihin haritalama tekniğinin dinleneni anlamaya etkisi, Yüksek Lisans tezi, Atatürk Üniversitesi Sosyal Bilimler Enstitüsü.

Aydın, G. (2010). Zihin haritalama tekniğinin dinleneni anlamaya ve kalıcılığa etkisi, *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi Dergisi*, 14(2), 1-16.

Aydın, F. & Ünaldı, Ü. E. (2010). The analysis of geography teacher candidates' perceptions towards "geography" concept with the help of metaphors. *International Online Journal Of Educational Sciences*, http://www.iojes.net/userfiles/Article/ IOJES_217.pdf adresinden 09.11.2011 tarihinde edinilmiştir.

Aydın, F. (2010). Ortaöğretim öğrencilerinin *coğrafya* kavramına ilişkin sahip oldukları metaforlar. *Kuram ve Uygulamada Eğitim Bilimleri (Educational Sciences: Theory & Practice), 10*(3), 1293–1322.

Aydoğdu, E. (2008). İlköğretim okullarındaki öğrenci ve öğretmenlerin sahip oldukları okul algıları ile ideal okul algılarının metaforlar (mecazlar) yardımıyla analizi. Yüksek Lisans Tezi, Eskişehir Osmangazi Üniversitesi Fen Bilimleri Enstitüsü.

Balcı, A. (1999). Metaphorical images of school: school perceptions of students, teachers and parents from four selected schools (in Ankara). Doktora Tezi. O.D.T.Ü. Eğitim Bilimleri Bölümü.

Balım, A.G., Evrekli, E. & Aydın, G. (2006-a). Zihin haritalama tekniğinin fen ve teknoloji öğretimindeki yeri. Avrupa Birliği ve Bütünleşme Sürecinde ilköğretim Eğitimi Sempozyumu, İzmir.

Balım, A.G., Evrekli, E. ve Aydın, G. (2006-b). Fen ve teknoloji öğretiminde zihin haritaları ve kavram haritaları kullanmanın önemi, VI. International Educational Technologies Conference, Turkish Republic of Northern Cyprus.

Bennett, B. ve Rolheiser, C. (2001). An Explanation of mind mapping. Beyond Monet: The Artful Science of Instructional Integration. Toronto: Bookation.

Brinkmann, A. (2003). Graphical knowledge displaymind mapping and concept mapping as efficient tools in mathematics education. *Mathematics Education Review,* 16, 3548.

Budd, J. W. (2004). Mind Maps As Classroom Exercises. *The Journal of Economic Education*. C. 35, S. 1, s.35-46. http://pdfserve.informaworld.com/326496__925324719.pdf adresinden 27.10.2011 tarihinde edinilmiştir.

Buzan, T. & Buzan, B. (1993). *The Maind Map Book*. London: BBC Books.

Buzan, T. (2002). *How to mind map,* London: Thorsons.

Buzan, T. (2008). *Zihinsel potansiyelinizi kullanmak için yeni öğrenme teknikleri: aklını kullan.* İstanbul: Alfa Yayınları.

Buzan, T. (2009) . *Akıl haritaları: yaratıcılığınızı harekete geçirin ve hayatınızı dönüştürün*. İstanbul: Boyut Yayınları.

Bütüner, S.Ö. (2006). Açılar ve üçgenler konusunun ilköğretim 7. sınıf öğrencilerine ve diyagramları ve zihin haritaları kullanılarak öğretimi, Yüksek Lisans Tezi, Balıkesir Üniversitesi Fen Bilimleri Enstitüsü.

Bütüner, S.Ö. (2007). Grafiksel bilgi gösterimi-matematik eğitiminde etkili araçlar olarak zihin ve kavram haritaları, http://ilkogretim-online.org.tr/vol6say1/v6s1c1.pdf adresinden 01.11.2011 tarihinde edinilmiştir.

Bütüner, S.Ö. & Gür, H. (2008). Açılar ve üçgenler konusunda anlamlı öğrenme araçlarından v diyagramları ve zihin haritaları kullanılarak öğretimi, *Necatibey Eğitim Fakültesi Fen ve Matematik Eğitimi Dergisi,* 2(1), 1-18.

Caine, R. N. & Caine, G. (2002). Beyin temelli öğrenme (Çev. Ed. Gülten Ülgen). Ankara: Nobel Yay.

Cerit, Y. (2008). Öğretmen kavramı ile ilgili metaforlara ilişkin öğrenci, öğretmen ve yöneticilerin görüşleri. Türk Eğitim Bilimleri Dergisi, sayı 6 (4), 693-712.

Chan, W. L. (2004). The Effectiveness Of Using Mind Mapping Skills In Enhancing Secondary One And Secondary Four Students' Writing In A CMI School (basılmamıÇ yüksek lisans tezi), University of Hong Kong. http://hub.hku.hk/bitstream/10722/31749/1/FullText.pdf adresinden 23.10.2011 tarihinde edinilmiştir.

Charmé, S. ve Horowıtz, B. (2008). Jewish identities in action: an exploration of models, metaphors, and methods, Journal of Jewish Education, 74, 115–143.

Coşkun, M. (2010). High School Students' Metaphors Towards "Climate" Concept According to Gender Variable. Educational Research and Review,

http://www.academicjournals.org./ERR/PDF/Pdf%202010/Nov/ Coskun.pdf adresinden 09.11.2011 tarihinde edinilmiştir.

Cryer, P. (2006). *Research student's guide to success*. Buckingham, GBR: Open University Press.

Çamlı, H. (2009). Bilgisayar destekli zihin haritalama tekniğinin ilköğretim 5. sınıf öğrencilerinin akademik başarılarına, fene ve bilgisayara yönelik tutumlarına etkisi, Yüksek Lisans tezi, Ege Üniversitesi Fen Bilimleri Enstitüsü.

Çamlı Çakır, H. & Altun, E. (2011). Bilgisayar destekli zihin haritalama tekniğinin ilköğretim 5. sınıf öğrencilerinin fen ve teknoloji dersindeki akademik başarılarına ve tutumlarına etkisi, *Eğitim Teknolojileri Araştırmaları Dergisi*, 2(4).

Davies, W. M. (2010). Concept mapping, mind mapping and argument mapping: what are the differences and do they matter?. Higher Education, http://www.tlu.fbe.unimelb.edu.au/teaching_staff/seminar_series/documents/Sem1CMMMAM.pdf adresinden 27.10.2011 tarihinde edinilmiştir.

Dönmez, Ö. (2008). Türk eğitim sisteminde kullanılan yönetici metaforları. Yüksek Lisans Tezi, Erciyes Üniversitesi Sosyal Bilimler Enstitüsü.

Elgin Kıdık, F. (2005). Canlılar çeşitlidir ünitesinin öğretilmesinde zihin haritalama tekniği kullanılarak geliştirilen yapılandırmacı öğretim yönteminin uygulanması ve geleneksel yöntemle karşılaştırılması, Yüksek Lisans Tezi, Balıkesir Üniversitesi Fen Bilimleri Enstitüsü.

Eppler, M. (2006). A comparision between concept maps, mind maps, conceptual diagrams and visual metaphors as complementary tools for knowledge construction and sharing, *Information Visualization*, 5(1), 202-210. http://liquidbriefing.com/twiki/pub/Dev/RefEppler2006/comparison_between_concept_maps_and_other_visualizations.pdf adresinden 22.10.2011 tarihinde edinilmiştir.

Evcim, U. (2008). Okul kültürünün algılanmasında metaforların rolü. Yüksek Lisans Tezi, Gazi Üniversitesi Sosyal Bilimler Enstitüsü.

Evrekli, E., Balım, A.G. & İnel, D. (2009). Mind mapping aplications in special teaching methods courses for sciences teacher candiatades and teacher canditades'opinions concering the applications, http://www.sciencedirect.com/science?_ob=MiamiImageURL&_cid=277811&_user=6809748&_pii=S1877042809004030&_check=y&_origin=browse&_zone=rslt_list_item&_coverDate=2009-12-31&wchp=dGLbVlt-zSkWb&md5=4d672c66d2b078d37ccf8650da098024/1-s2.0-S1877042809004030-main.pdf adresinden 04.11.2011 tarihinde edinilmiştir.

Evrekli, E. (2010). Fen ve teknoloji öğretiminde zihin haritası ve kavram karikatürü etkinliklerin öğrencilerin akademik başarılarına ve sorgulayıcı öğrenme beceri algılarına etkisi, Yüksek Lisans Tezi, Dokuz Eylül Üniversitesi Eğitim Bilimleri Enstitüsü.

Evrekli, E. ve Balım, A.G. (2010). Fen ve teknoloji öğretiminde zihin haritası ve kavram karikatürü kullanımının öğrencilerin akademik başarılarına ve sorgulayıcı öğrenme becerileri algılarına etkisi, http://web.deu.edu.tr/baed/giris/2_2.pdf adresinden 31.10.2011 tarihinde edinilmiştir.

Farrand, P., Hussain, F. & Hennessy, E. (2002). The efficacy of mind map study technique. Medical Education, http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2923.2002.01205.x/abstract adresinden 10.11.2011 tarihinde edinilmiştir.

Galea, S. R. & Singh, J. K. K. A. (2004). Teaching literature through mind maps. Malaysian English Language Teaching Association. C. 33. http://www.melta.org.my/ET/2004/2004-127.pdf adresinden 21.10.2011 tarihinde edinilmiştir.

Geçit, Y. & Gençer, G. (2010). Sınıf öğretmenliği 1. sınıf öğrencilerinin coğrafya algılarının metafor yoluyla belirlenmesi (rize üniversitesi örneği), http://www.marmaracografya.com/pdf/23.1.pdf adresinden 10.11.2011 tarihinde edinilmiştir.

Gelb, J.M. (1995). *Düşünmenin tam zamanı.* İstanbul: Arion Yayınevi.

Gibson, C.B. & Zellmer-Bruhn M.E. (2001). Metaphors and Meaning: An Intercultural Analysis of the Concept of Teamwork. *Administrative Science Quarterly*, 46, 274-303.

Girmen, P. (2007). İlköğretim öğrencilerinin konuşma ve yazma sürecinde metaforlardan yararlanma durumları. Doktora Tezi, Anadolu Üniversitesi Eğitim Bilimleri Enstitüsü.

Goatly, A. (1997). The Language of Metaphors, Routledge, Great Britain.

Goode, M. M. H. (2008). Mind mapping in lectures. Reader in Marketing Distinguished Teaching Award Winner 2008, Swansea University. http://www.swan.ac.uk/media/media,32275,en.pdf adresinden 24.10.2011 tarihinde edinilmiştir.

Goodnough, K. & Woods, R. (2002). *Student and teacher perceptions of mind mapping: a middle school case study*. Annual Meeting of The American Educational Research Association, New Orleans, Los Angles, U.S. A.

Gür, H. & Bütüner, S.Ö. (2006). Matematik dersinde kullanılan zihin haritalama tekniğine yönelik tutum ölçeğinin geliştirilmesi, http://ilkogretim-online.org.tr/vol5say2/v5s2m5.pdf adresinden 31.10.2011 tarihinde edinilmiştir.

Henze, R. C. (2005). Metaphors of diversity, ıntergroup relations, and equity in the discourse of educatinal leaders, *Journal of Language, Identity and Education,* 4(4), 243-267.

Karadaş, F. (2007). Imagination, metaphor and mythopoeia in the poetry of three major English romantic poets. Doktora Tezi, ODTÜ, Sosyal Bilimler Enstitüsü.

Kaya, H. (2010). Metaphors developed by secondary school students towards "earthquake" concept. *Educational Research and Review,* http://www.academicjournals.org/ERR/PDF /Pdf%202010/Nov/Kaya.pdf adresinden 10.11.2011 tarihinde edinilmiştir.

Karataş, S. (2010). Bilgisayar ve öğretim teknolojileri (BÖTE) öğretmen adaylarının mesleklerine ilişkin Zihin haritalarının analizi (Gazi Üniversitesi Örneği), http://gazi.academia.edu/Ser%C3%A7inKarata %C5%9F/Papers/512396/Bilgisayar_ve_Ogretim_Teknolojileri_BOTE_Ogretmen_Adaylarinin_Meslekle rine_Dliskin_Zihin_Haritalarinin_Analizi_Gazi_Universitesi_Ornegi_ adresinden 04.11.2011 tarihinde edinilmiştir.

Kartal, A. (2011). Zihin haritalama tekniğinin sosyal bilgiler dersinde öğrenci başarısı, tutumu ve kalıcılığına etkisi, Yüksek Lisans Tezi, Rize Üniversitesi Sosyal Bilimler Enstitüsü.

Kortelainen, T. & Vanhala, M. (2004). Portfolio, peer evaluation, and mind map in an introductory course of information studies. *Journal of Education for Library and Information Science,* 45(4), 273–285.

Kovecses, Z. (2002). *Metaphor A Practical Introduction*, Oxford University Press, New York.

Lakoff, G. & Johnson, M. (1980). *Metaphors we live by*. Chicago, IL: University of Chicago Press.

Levine, P.M. (2005) Metaphors and Images of Classrooms, *Kappa Delta Pi Record*, 41(4), 172-175.

Littlemore, J. (2004). Conceptual metaphor as a vehicle for promoting critical thinking skills amongst international students, Directions for the Future: Directions in English for Academic Purposes, Ed.: L. Sheldon, Oxford Peter Language, Birmingham, 43 -50.

Mento, A. J., Martinelli, P. & Jones, R. M. (1999). Mind mapping in executive education: Applications and outcomes. *Journal of Management Development*, 18(4), 390407.

Merdivan, E. (2007). Farklı metafor kullanımlarının hipermetin öğrenimine etkileri. Yüksek Lisans Tezi, Marmara Üniversitesi Eğitim Bilimleri Enstitüsü.

Moi, W. A. G. & Lian, O. L. (2007). Introducing mind map in comprehension. Educational Research Association (Singapore). Redesigning Pedagogy International Conferences: Culture, Knowledge and Understanding, 28-30 May. 2007http://conference.nie.edu.sg/2007/paper/papers/LAN469.pdf adresinden 18.11.2011 tarihinde edinilmiştir.

Morgan, G. (1983), "More on Metafor: Why We Cannot Contol Tropes in Administrative Science", *Administrative Science Quarterly*, 28(4), 601–607.

Mueller, A., Johnston, M.& Bligh, D. (2002). Joining mind mapping and care planning to enhance student critical thinking and achieve holistic nursing care. *Nursing Diagnosis*, 13(1), 2427.

Öztürk, Ç. (2007) Sosyal bilgiler, sınıf ve fen bilgisi öğretmen adaylarının 'coğrafya' kavramına yönelik metafor durumları. *Ahi Evren Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, 8(2),55–69.

Ponterotto, D., (1994). Metaphors We Can Learn By, *Forum*, 32 (3), 2-8.

Rızvanoğlu, K. (2007). Grafik kullanıcı ara yüzlerinde metaforların kültürlerarası kavranışı (Fransa ve Türkiye'de bir e-öğrenim sitesi üzerinden karşılaştırmalı bir çalışma). Doktora Tezi, Marmara Üniversitesi Sosyal Bilimler Enstitüsü.

Saban, A. (2004). Giriş düzeyindeki sınıf öğretmen adaylarının "öğretmen" kavramına ilişkin ileri sürdükleri metaforlar. *Türk Eğitim Bilimleri Dergisi*, 2(2), 131-155.

Saban, A. (2005). *Çoklu zekâ teorisi ve eğitim*. Ankara: Nobel Yayınları.

Saban, A., Koçbeker, B. N. & Saban A. (2006). Öğretmen adaylarının öğretmen kavramına ilişkin algılarının metafor analizi yoluyla incelenmesi. *Kuram ve Uygulamada Eğitim Bilimleri (Educational Sciences: Theory & Practice)*, 6(2), 461-522.

Saban, A. (2009). Öğretmen adaylarının öğrenci kavramına ilişkin sahip oldukları zihinsel imgeler. Türk Eğitim Bilimleri Dergisi, 7(2), 281-326.

Semerci, Ç. (2007). "Program geliştirme" kavramına ilişkin metaforlarla yeni ilköğretim programlarına farklı bir bakış. *Cumhuriyet Üniversitesi Sosyal Bilimler Dergisi*, 31, 125-140.

Shaw, D. M., Barry A. & Mahlios M. (2008). Preservice teachers' metaphors of teaching in relation to literacy beliefs, *Teachers And Teaching: Theory And Practice,* 14(1), 35–50.

Steyn, T. & Boer, A. (1998). Mind mapping as a study tool for underprepared students in matematics and sciences, *South African Journal of Ethnology*, 21(3), 1-11.

Stutzle, T. & Sajaniemi, J. (2005). An Emprical Evaluation of Visual Metaphors in the Animation of Roles of Variables, *Informing Science Journal*, 8, 87-100.

Sznajder H. S. (2010). A corpus-based evaluation of metaphors in a business english textbook, *English for Specific Purposes*, 29(1), 30-42.

Şeyihoğlu, A. & Kartal, A. (2010). Yapılandırmacı yaklaşım temelli ilköğretim hayat bilgisi ve sosyal bilgiler derslerinde zihin haritalama tekniğine ilişkin öğretmen görüşleri, *Kuram ve Uygulamada Eğitim Bilimleri Dergisi*, 10(3), 1613-1656.

Şeyihoğlu, A. & Gencer, G. (2011). Hayat Bilgisi Öğretiminde "Metafor" Tekniğinin Kullanımı, *Türk Fen Eğitimi Dergisi (TÜFED)*, 8(3), 69-79.

Tamimi, Y. (2005). Örgüt kültürünün metaforlarla analizi (Tekstil sektöründe faaliyet gösteren bir işletme örneği), Yüksek Lisans Tezi, Eskişehir Osmangazi Üniversitesi, Sosyal Bilimler Enstitüsü.

Taş, H.İ. (2003). Zihinsel haritalama ve öğrencilerin zihni haritalarını geliştirme yolları. http://www.marmaracografya.com/pdf/8-1-hibrahimtas-zihinselharitalamaveogrencilerinzihniharitalarinigelistirmeyollari-.pdf adresinden 01.11.2011 tarihinde edinilmiştir.

Treviño, C. (2005). Mind mapping and outlining: comparing two types of graphic organizers for learning seventh-grade life science. Unpublished PhD Thesis, Texas Tech University, Texas.

Tucker, J. M. ve Diğerleri. (2010). Profiling a mind map user: a descriptive appraisal. *Journal of İnstructional Pedagogies*, 2, 1-13. http://www.aabri.com/manuscripts/09264.pdf adresinden 25.10.2011 tarihinde edinilmiştir.

Tunçel, H. (2002). Türk öğrencilerin zihin haritalarında İslam ülkeleri, http://web.firat.edu.tr/sosyalbil/dergi/arsiv/cilt12/sayi2/083-103.pdf adresinden 04.11.2011 tarihinde edinilmiştir.

Virginia S, E.(1992). Mathematical mind mapping, *The Mathematics Teacher*, 85(6), 444–445.

Yang, F. G., Edens, J., Simpson, C. & Krawczyk, D. C., (2009). Differences in task demands influence the hemispheric lateralization and neural correlates of metaphor, *Brain and Language,* 111(2), 114-124

Yaşar, I.Z. (2006). Fen eğitiminde zihin haritalama tekniğiyle not tutmanın kavram öğrenmeye ve başarıya etkisi. Yüksek Lisans Tezi, Marmara Üniversitesi Eğitim Bilimleri Enstitüsü.

Yavaş, A. (2011). Ardıl çeviri eğitiminde zihin haritaları oluşturma yönteminin etkililik derecesi. Yüksek Lisans Tezi, Yıldız Teknik Üniversitesi Sosyal Bilimler Enstitüsü.

Yıldırım, A. ve H. Şimşek (2005). *Sosyal bilimlerde nitel araştırma yöntemleri* (5. Baskı), Ankara: Seçkin Yayınevi.

Ward, R., & Wandersee, J.H. (2002). Student's perceptions of roundhouse diagramming: a middle-school viewpoint. *International Journal of Science Education,* 24(2),205–225.

Wickramasinghe, A., Widanapathirana, N., Kuruppu, O., Liyanage, I. & Karunathilake, I. (2008). Effectiveness of mind maps as a learning tool for medical students. *South East Asian Journal of Medical Education,* 1(1), 3032.