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Full Length Research Paper

Opinions of the geography teacher candidates toward mind maps

Ayşegül Şeyihoğlu

Karadeniz Technical University Fatih Education Faculty, Trabzon, Turkey. E-mail: aysegulseyihoglu@gmail.com.

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The purpose of this study is to reveal the opinions of the teacher candidates about mind mapping technique used in Geography education of undergraduate program. In this study, the qualitative research techniques were used. The study group consists of 55 teacher candidates. The teacher candidates have been asked for their opinions about the process via semi-structured interview form. The interviews have been analyzed using content analysis. According to the findings, the teacher candidates think that mind mapping technique is a thriving one in terms of learning process, student and material design. The theme of this technique in terms of learning consists of the codes as "pave the way for learning, ensure retentive learning, emphasizing the basic concepts, summarizing, organizing, eye-catching, its capability of using a humoristic language, its capability of showing the relations". The theme in terms of student consists of codes as "improve creativity, improve computer skills, keep away from memorization, improves social relations and improve capacity to render/interpret". The theme in terms of material consists of codes as "visuality, easiness, practicality, enjoyable, time saving, multimedia, and proper use of computer. In the conclusion of the research it was recommended to inform the teachers and teacher candidates on the technique, extending it by diversifying the practice areas of the technique, and study its usability in other disciplines.

Key words: Geography education, geography teacher candidate, mind maps, geography.

INTRODUCTION

Countries that finished their development have gone through renovation in their education system, curricula, teaching methods and techniques. This situation has also affected the trends in geography education and necessitated more research on geography education (Lambert, 2010). Such topics as "which methods are more suitable to teach geography lessons efficiently to the students growing up in a technology world, how to maximize their qualifications and skills on track to be a good citizen and in which ways the technology can be used in geography education are some of these tendencies (İncekara, 2009, p.125). But mostly, the principles and facts are taught by making them memorized (Tomal, 2009). The same problem is in effect for many courses in our country, and one of theses courses is Geography defined by the students as unattractive, abstract, pure stack information, and based on memorization (Akınoğlu, 2005; Tomal, 2009). Not using contemporary approaches, methods, techniques, tools and technologies necessarily and effectively are among the basis of these aforesaid problems. For this reason, such techniques as mind maps constituting the subject of research are required in terms of enabling the learning and learning environments to be more effective since mind maps may enable the lobes responsible for the different activities of the brain to operate simultaneously.

The related studies that have been made in recent years in our country, concentrated in the area of mathematics with science and technology. For example, in the field of science and technology, the mind mapping technique was based on a comparison of traditional methods and, used to study the effect of student achievements (Yaşar, 2006). Again, in science education, the effect of the concept mind map technique on learning and academic success was studied (Kidik, 2005). In the field of mathematics, mind map oriented attitude scale

development work (Gür and Bütüner, 2006), the study that researched the effects of student success of teaching angles and triangles using mind maps (Bütüner, 2006) can be stated as examples. Çamli (2009) studied the effect of mind-mapping on paper and computer-aided mind mapping techniques, on primary 5th students' academic achievements, and their attitudes towards computer in Science and Technology lessons. Evrekli (2010) studied the effect of mind map in science and technology education on students' academic achievements and perceptions of inquisitive learning skills. Derelioğlu's (2005) study on the use of mind maps in Life Science and Social Studies lesson is available. Again Şeyihoğlu and Kartal (2010) have made a research to determine teacher's opinions on using mind maps in Life Science and Social Studies classes. Kahveci (2004) studied the effect of summarizing on reading comprehension in visually handicapped individuals by using the mind maps with technical assistance in the field of special education. In the field of Turkish education, Paykoç et al. (2004) 's mind maps that are built by graduate students for the purpose of brainstorming to bring out the Turkey's main curriculum topics exists. Aslan (2006) have studied whether there is a significant difference between traditional teaching methods and mind mapping technique on fourth grade elementary school Turkish teaching, informative text comprehension, summarizing and remembering skills. Again, Aydın (2009) studied whether there is a difference between the traditional note-taking techniques and taking notes with mind mapping technique on Turkish education department students' understanding and remembering the texts they listened. Kartal (2011) studied the effect of mind map in social studies course, on students' academic achievements and attitudes.

As shown in studies, cases such as the effect of the mind map technique on student achievement, contribution to learning concepts, and comparison with traditional methods were evaluated. In survey of the literature, it can be stated that there was no application in geography teaching technique and taking the views of the future appliers of the technique on their students, can be said to represent a first attempt. Taking the views of teacher candidates on the implementation of the mind-mapping technique on Geography courses and at undergraduate level, is thought to be an important step to contribute to increase the applicability of the technique

Based on all these explanations, the problem situation which is the subject to study with the aim of filling the gap in the literature can be described as follows: "What are the geography teacher candidates' opinions regarding the mind maps applied in undergraduate level geography education?" Problem sentence sought answers depending on the sub-problems listed as follows:

• What are the aspects of mind-mapping technique favored by geography teachers?
• What aspects of mind-mapping technique are unpopular by geography teachers?
• Are Geography teacher candidates thinking about the application of mind map technique, in their future professional life?
• What drawing techniques of mind maps are appropriate to geography teacher candidates? Why?
• What is the availability of using mind map technique in other courses in terms of Geography teachers?

METHOD

In this study, the qualitative research techniques were used. These techniques try to reveal the relations that make explanation rather than measurement possible, and attach importance to the situation in which the events and phenomenon take place. Phenomenology, a pattern of the qualitative research was utilized. Phenomenology focuses on the events that we are familiar with but do not know them in details. Even though the events are often encountered within the daily life, this familiarity does not mean that they are fully understood. Phenomenology constitutes a good research ground for the studies aiming to study the phenomena that are familiar but whose meaning is not fully-understood (Yıldırım and Şimşek, 2008).

The data were coded, themes were identified, and after codes and themes were organized, the findings were explained and interpreted. The aim of these procedures is to gather, organize and interpret similar data in the context of specific concepts and themes.

Participants

The study group consisted of 55 teacher candidates at the Department of Geography Teaching in Fatih Education Faculty of Karadeniz Technical University in 2010 to 2011 academic year. 28 of these candidates were freshmen while 27 of them were sophomores. The study was conducted in the classes where the researcher taught Climatology II and Hydrography II courses.

Data collection tool and data analysis

The research data were collected during spring term in the academic year of 2010 to 2011. The climatology II is studied by the freshmen and has 4 course hours per week. Hydrography II is, however, studied by the sophomores and has 3 course hours per week. In the implementation stage of the research, the Geography Teacher Candidates were first informed about the mind mapping technique through theoretical and practical courses (1 course hour for each). As seen in Table 1, the Geography teacher candidates were shown samples of mind maps developed by the researcher concerning geography education. Then they were required to reflect what they had learned to mind maps weekly. During one course hour, the teacher candidates were trained practically on the Inspiration 9.0 software in order to enable them draw their mind maps on computer and the sample drawings were shared with them. The candidates who preferred to draw by hand were provided with necessary materials (Bristol boards, paint pencils, etc…). The maps in relation to the subjects of the previous week were collected in the first course of the following week. These works were archived in files created for each candidate. The teacher candidates' views in relation to the process were obtained by means of a semi-

Table 1. Geography teacher candidates' positive views towards mind maps.

Codes and themes			Participant	N	%	Sample sentence
The appreciated sides of mind map by Geography Teacher Candidates	In terms of learning	Facilitates understanding	1,2,4,6,7,9,10,11,13,15,16,18,19,21,23,26,27,29,30,31,32,34,35,36,37,39,41,44,45,48,49,52,53,55	34	61	4 "All teachers should use it to make difficult and complicated subjects simple and understandable" 31 "Since it provides visuality, the information is simply sent to the long term memory"
		Retentive	1,4,11,12,13,20,28,30,31,32,29,31,33,38,42,43,46,47,49,51,54	21	38	13 "Because the techniques is based on practicing personally and understanding, it is more retentive and appropriate for learning" 20 "Actually, I am not good at memorizing, but when I look at the map designed based on this technique, the pictures remind me what I have read"
		Emphasizing concepts	2,11,19,20,22,23,31,32,33,37,40,41,43,45,46,49,50,52,55	19	35	31 "It is reasonable to simplify long and boring subjects" 32 "…it also ensure keeping the information in mind through key words"
		Summarizing	2,5,10,18,22,27,30,35,39,41,43,46,47,50,51,53,54	17	31	5 "The aspect that I like most is that the summary of the subject can be reduced to a single word. When you see the word, you can master the whole subject" 30 "With mind map, the subjects can be summarized, and memorable presentations can be conducted"
		Systemizing	1,4,6,7,9,10,13,19,23,25,27,34,37,46,49,50,55	17	31	1 "It saves the subject from complexity and makes it more understandable" 4 "All teachers should use it to make difficult and complicated subjects simple and understandable"
		Eye catching	1,2,4,8,10,11,12,16,26,32,44,53	12	22	23 "…besides it is pretty successful in attracting students' attention" 27 "the subjects becomes very attractive with sounds and colors"
		Using a humoristic language	6,10,16,14,15,23,27,30,31,48,51,52	12	22	10 "Also the humoristic approach employed in the pictures increased the memo ability" 31 " In my opinion, presenting the subject in a short form and with an enjoyable language enables memorability and improves the creativity of the composer"
		Showing the Relations	13,17,18,19,23,25,29,37,45,53	10	18	13 "Setting the bridges arrows among the concepts is one of the technique's aspects I like" 53 "Whenever I want, I can relate them with one another and show them."

Table 1. Contd.

		Developing creativity	1,3,4,5,6,11,12,14,15, 19,24,25,28,30,31,32, 37,39,40,41,43,46,48, 49,52,54	26	47	15 “It important that with this technique one can create something original to himself/herself which requires creative thinking” 24 “I also support my students to produce original ideas and be creative. Therefore, I should use this technique in the future”
		Improving computer skills	1,3,5,6,10,15,17,18,21 ,26,29,30,34,39,42,43, 47,50,52,55	20	36	26 “It developed my computer operation skills” 47 “I am searching for the softwares that can pave the way for preparing such kinds of materials. In the beginning, I was an amateur to use these materials”
	In terms of students	Keeping away from memorization	4,5,7,12,18,20,22,26,2 7,29,31,34,47,54,	14	25	12 “It secures the memorability of the information through visuality instead of memorization” 54 “The aim is to summarize the summary and then draw its picture. No room for memorization”
		Developing social relations	6,12,14,18,19,22,27,3 0,36,41,43,49,50	13	24	6 “Thanks to the group work we have improved communication and shared work with each other” 50 “Mind maps give clues about their personalities. You can guess what is on anyone’s map. Therefore, we get to know each other “
		Improving the capacity to render/interpret	5,6,13,16,19,22,30,35, 38,40,49,52	12	22	30 “Using this technique and studying by means of these maps can help students improve their capacity to interpret” 52 “Analyzing another person’s mind map requires the ability to render the subject from a different perspective”
		Visuality	2,4,5,6,8,11,12,13,15,2 0,25,28,31,37,38,42,43 ,46,49,50,52,55	22	40	15 “Nice pictures are more memorable than writing since they visualize the information” 37 “It is meaningful for someone to understand and learn the subject and improve himself/herself through the pictures presented in relation to the subject”
In terms of materials		Easiness	7,17,18,19,20,23,26,28 ,30,34,35,37,42,47,50, 54	16	29	14 “…that it can be prepared easily in a short time…” 34 “It is a big advantage that sub-sectioning can be done so easily”
		Practicality	1,2,3,7,8,9,10,14,21,26 29,34,44,53	14	25	3 “Its providing the transfer of information easily increases its usability” 10 “I can teach the subject to the students easier in that way”

Table 1. Contd.

	Enjoyable	4,7,11,12,1419,20,23,27,29,31,32,47,55	13	24	20 "Learning how to use the software, I have great fun to use it" 31 "I prefer teaching subjects to my students through a material which is comic and has caricatures rather than teaching in a long and boring way"
	Multimedia	2,3,8,14,17,22,25,35,41,46,50	11	20	22"It is possible to use writing, picture and video in this technique; it is a sophisticated technique" 25 "It is the richness of the technique that the information can be supported by visuals, sounds, and motions"
	Time saving	1,7,14,26,29,32,37,40,47,49,54	11	20	14 "It is time saving for it can be prepared in a short time" 26 "… in this way I will both contribute to teachers' learning and be able to teach a subject in a shorter time"
	Relevant use of computer	6,11,21,23,30,35,39,41,42,47	10	18	6 "It will encourage the children to use computer in a good way" 21 "The technique is quite practicable. The fact that the pictures are very clear and of high definition on computer promotes the use of computers"

structured interview form consisting of 4 questions:

(i) What are the appreciated sides of mind map technique?
(ii) What are the unappreciated sides of mind map technique?
(iii) Do you think of using this technique in your professional life?
(iv) Which method do you prefer to draw mind maps? Why?

Two experts were asked for their opinions on these questions. A recording device was utilized to minimize the troubles in recording data. Every teacher candidate was interviewed one to one. Total recording time was about 4 h. In order to receive the candidates' opinions properly, all easiness were tried to be ensured, they were given sufficient time, and no video recording was taken. The recordings were listened and the interviews were transcribed. The transcripts were confirmed by listening the recordings again and again. The data acquired through semi-structured interview forms was classified under the similar codes and themes, and it was evaluated. For this purpose, the themes and codes were determined based on teachers' views during content analysis of the study. Also samples from the related Teacher candidates' views were given in order to make the codes and themes more understandable.

To ensure the reliability of the research, after the recordings were transcribed, besides the researcher, a researcher coded the transcripts independently, and the results were compared. The codings were corresponding to each other. In this way, the codings were provided based on a common point of view and free of bias and misunderstandings. The baselines for the relations between codes were determined; a consensus between the researchers was pursued in order to build themes. The codes being under a specific theme were paid attention to be distinct from the other codes under any other theme. The views of another expert were received in relation to all codes and themes on which the researchers had consensus. It is possible to claim the fact that the researcher was teaching the two classes that were included in the research to ensure that the interviews were held in an environment of confidence. This environment of confidence can be said to increase the reliability of the research.

FINDINGS AND DISCUSSION

After the tools of data collection were applied to the research group, the acquired data was coded on computer environment. The data obtained in relation to each sub-problem are given in Table 1.

The first sub-problem of the research is "What are the appreciated aspects of Mind Map Technique by Geography Teacher Candidates?" The findings pertaining to this sub-problem are given

in Table 1.

As shown in Table 1, the Geography Teacher Candidates' positive views toward mind map technique are analyzed under 3 themes: in terms of learning, in terms of students, and in terms of materials. Here is the analysis of these themes according to the codes and their percentages (%):

The theme "in terms of learning" includes facilitating understanding (61%), providing retentive learning (38%), empha-sizing basic concepts (35%), summarizing (31%), systemizing (31%), eye catching (22%), using humoristic language (22%), and showing the relations (18%).

According to the codes, a considerable majority of the participants agree that mind maps facilitate understanding (61%) and provide retentive learning (38%). These findings have parallelism with the idea shared by Gelb (1995). The results obtained from the study by Şeyihoğlu and Kartal (2010) are in favor of the idea that mind maps facilitate understanding and provide retentive learning. The efficiency of the technique in terms of summarizing is supported by Brinkmann's (2003) argument that "a subject of a studied unit can be organized and reviewed by means of a mind map. This mind map can be kept in mind for it can serve as good summary". The effect of mind maps in systemizing and showing the relations among the pieces of information (quoted by Şeyihoğlu and Kartal, 2010, p.15) complies with Aalia (2004) and Budd's (2004) ideas and Tergan's (1986) view that "the hierarchical structure of mind map corresponds to that of information". At the same time, Şeyihoğlu and Kartal's (2010) view that "it achieves learning within scheme and a hierarchy," have parallelism with the findings of the research.

The themes with regards to student include the codes such as "improving creativity (47%), improving computer skills (36%), keeping away from memorization (25%), improving social relations (24%), and improving the capacity to render (22%)". As shown by the findings, the students agree that mind maps are quite effective in developing creativity. Brinkmann's (2003) notion that "minds map is a strong technique to reveal the potential of the mind" supports the research findings. Likewise, it corresponds to the view by Şeyihoğlu and Kartal (2010) asserting that "setting the communication between the two hemispheres of the brain, mind map enables the child to express the concept visually, and thereby helps him/her imagine the image or object recalling the concept which ensures the development of imagination and creative thinking". The opinions in relation with the technique's developing computer skills coincide with the results obtained by Çamlı (2009). Another finding of the research is the view suggesting that mind maps keeps students away from memorization. Especially, it overlaps with the idea that "besides its effect in increasing desire for learning, the use of mind-based methods and techniques in courses based on memorization facilitates learning through "structuring" instead of "rote learning" by establishing an interrelation between old and new information in the process of learning subjects and concepts". There is a great deal of studies (Erduran Avcı and Yağbasan, 2008, p.3; Kahveci and Ay, 2008, p.109; Keleş and Çepni, 2006, p. 80; quoted: Kartal, 2011) that support this finding. The participants stated that the technique was efficient in reflecting the personality and improving the social relations. As an example, the study by Ersoy and Kaya (2008, p. 296) shows that the students enjoy such kinds of activities. The view that mind maps improves the capacity to render is in accord with Şeyihoğlu and Kartal's (2010) argument that "being one of the most beneficial techniques in securing retentive information, mind maps are the best supporter of the students. A student using this technique can achieve learning by means of relating the subject to not only one field but to several fields".

The theme related to material includes the following codes: providing visuality (40%), easiness (29%), practicality (25%), enjoyable (24%), providing multimedia (20%), saving of time (20%), and use of computer relevantly (18%). Mind maps are thought to visualize the information. These findings have parallelism with Öztürk's (2005: p.176–177) idea that "In this system which turns into a visual festivity with coloured pencils, information is kept in mind for longer time and recalled more quickly". Besides, mind map technique is regarded as easy, practical, and enjoyable. Gelb's (2002, p.112; quoted: Şeyihoğlu and Kartal, 2010:p.15) argument that "Colors, images, and key words; in other words, the tree basic components of mind maps are adapted more easily than the sentences" complies with the finding. The fact that mind maps can be enriched with a variety of visuals and multimedia is found quite beneficial by the students. As stated by Davies (2010; quoted: Kartal, 2011:p.122), the mind mapping is a technique in which line thicknesses, colors, images, and diagrams are employed to facilitate remembering the information.

The second sub-problem of the research is "What are the disliked aspects of mind map technique in terms of Geography Teacher Candidates?" The findings for this sub-problem are presented in Table 2.

As shown in Table 2, the geography teacher candidates' negative thoughts against mind map technique are analyzed in 3 themes: in terms of students (candidates), in terms of drawing program, and visuality. These themes are examined in details and listed according to their percentages.

The theme "In terms of teacher candidates" includes codes like "inexperience (31%), addiction to computer (20%), inclining to laziness (16%), subjectivity (16%), time consuming (13%), and confusion with concept map (11%). The candidates stated that they had problems since it was the first time they were using that technique. Just as stated by Kan (2006, pp. 537-544), these findings

Table 2. Geography teacher candidates' negative thoughts against mind maps.

Codes and themes			Participant	N	%	Sample sentence
Unappreciated sides of mind maps by geography teachers candidates	In terms of teacher	Inexperience	1,2,4,5,7,14,15,23,26,27,28,30,32,43,49,52,54	17	31	1 "Because I am a new user, I had problem in practice" 27 "Due to inexperience we panicked first, but we saw that it was easy to prepare and present this technique"
		Addiction to computer	2,6,14,15,23,31,35,37,38,44,50	11	20	2 "The only aspect of this technique I dislike is that we have one more factor tying us to computer" 35 "Having a computer is a must to utilize the technique"
		Inclining to laziness	6,17,23,26,33,37,38,41,49	9	16	26 "Also this technique may incline the students to laziness" 23 "Everything is ready-made… subsections, images… The student will combine them through a single click"
		Subjectivity	5,9,14,17,20,25,33,46,52	9	16	20 "The map may not raise the same connotations for the readers of the map except for the person who creates it" 46 "It takes me time to find the image that expresses me"
		Time consuming	2,7,18,33,36,41,50	7	13	7 "We were scared at first since we were going to get prepared through an unknown technique" 50 "I can say that we spent most of time on this course during this term"
		Confusion with concept map	11,17,24,25,39,46	6	11	24 "If the technique is not fully understood, it is possible that a concept map might be prepared instead of a mind map" 42 "The image than comes to my mind or the image that represents the subject? They should not be confused with each other"
	In terms of drawing program	Language of the program	1,2,7,8,15,20,33,47,48,55	10	18	1 "If the program language was Turkish we could use it more efficiently" 2 "The English menu made our work more difficult"
		Inabilities of the program	3,5,24,33,36,48	6	11	5"You cannot go deeper into details. As the number of subsections increases, the subject becomes inextricable" 33 "The features that make the use more practical can be added to the program. The drawings as in Paint can be added"

Table 2. Contd.

In terms of visuality	Insufficiency of the visuality	4,9,13,26,31,41	6	11	13 "There could be more images related to every course" 26 "It takes a long time to transfer one's own drawings there"
	Inability to adjust the print size	5,11,12,15,24,33,47	7	13	11 "we adjust its size to fit the pc screen; however, when we print it out, the image size remains too small to read" 12 "There is a problem with the size of maps. When we print them, they remain too small to read"
	Confusion	5,16,33,41,47,48	6	11	5 "As the number of subsections increases, the subject becomes inextricable"" 16 "when the number of subsections increases, the scripts and images intermingle."

along with the studies conducted on the use of new methods and techniques put forward that they are not employed so much. Beside the factors such as the limited course duration, intensive curriculum, and insufficient course materials, lack of enough knowledge about the methods and teachers' preference can be added to the reasons for the negligence of the methods. The candidates stated that softwares might cause addiction to computer and result in laziness. However, the study by Çamlı (2009) does not correspond to this finding. In his study, Çamlı (2009) used computer-aided mind maps and determined that it had positive impression on students' academic success and attitude. The teachnique's being subjective and time consuming are the other negative views. The argument by Wallace and Mintzes (quoted from 1990: Bütüner, 2006) that "It leads to waste of time for teachers to present mind mapping technique and for students to comprehend it if the students are far from creativity and have perception constraints", and Kazu and Özdemir's (2009, quoted: Şeyihoğlu and Kartal, 2010: p.15) view that "Both genetics and the environment more or less make a person different from another. Individuals ca not be expected to realize all the details identically with others" have parallelism with the findings of the research. It was stated that the technique might be confused with concept maps. As a matter of fact Balım et al. (2006) called attention to a similar finding, and suggested to make a distinction between these techniques.

The theme in relation with the drawing program involves the codes "the language of the program (18%), inabilities of the program (11%), and the visual insufficiency (11%)". The participants remarked that there were defects in the mind mapping technique with respect to drawing programs. However, these findings are thought to be caused by lack of competency and inexperience.

The theme related to visuality contains "Inability to adjust the print size (13%) and confusion (11%). The candidates expressed that confusion might occur in drawing of the mind maps in terms of visuality. This view has accordance with Kartal's (2011) opinion that "In cases where the connections among the ideas are not established properly, and the chosen key words are failed to be related to the whole subject, the product that comes to existence becomes a map of confusion rather than a mind map".

The third sub-problem of the research is "Are the Geography Teacher Candidates willing to use the mind mapping technique in their professional life?" The findings for this sub-problem are shown in Table 3.

As seen in Table 3, geography teacher candidates' views on the use of mind map technique in their professional life were analyzed in three themes: "Yes, It Depends on the conditions, and No".

Those considering using mind maps in their professional life are predominant (65%). The theme "It depends (31%)" includes "Level,

Table 3. Geography teacher candidates' views about whether they would like to use mind map technique in their professional life.

	Codes and themes		Participant	N	%	Sample sentence
The usability of the technique in the professional life	Yes		1,2,3,4,6,9,10,11, 12,13,14,15,17,18 ,20,21,23,25,26,2 7,28,29,30,31,32, 34,37,38,42,46,49 ,51,52,53,54,55	36	65	21 "I certainly would like to use this technique. It improves students' perception and enables mind exercise" 23 "I would like to have my students use this technique; so as to help them improve their creativity"
	It depends on	Level	5,7,8,16,19,22,24, 35,40,44,45,47	12	22	16 "I would like to apply this technique only with the 5th graders" 47 "it can be more efficient on small kids since it is colorful, visual and amusing"
		Technological infrastructure	7,24,35,39,41,43, 48,50	8	15	24 "in village schools computers may not be available. Therefore, it is better to have students draw their maps on cardboards" 35 "… but computer is needed to apply this technique"
		Classroom size	5,7,8,16,33,48,50	7	13	5 "I use if the number of the students in the classroom is low" 16 "It takes a lot of time in the crowded classrooms"
		Availability of computer	8,24	2	4	8 "I'll use it, but I'll require the students to prepare it by hand without any assistance from other people. If they do it by themselves, it will develop creativity and ensure the retention" 24 "I'll have it prepared by hand because computer may not be available in the village schools"
	No		33,36	2	4	33 "I don't think that I can use the technique as my students may not take it seriously" 36 "I don't think I can use it so often. It can be used not in teaching but in evaluation"

Technological infrastructure, Classroom size, and Availability of computer". These views and their arguments overlap with views of Buzan (2009) and Öztürk (2005). Though very limited (4%), those who are not willing to use the technique are available.

The forth sub-problem of the research is "Which methods do the geography teacher candidates prefer to draw mind maps? Why?" Findings in concerning this sub-problem are presented in Table 4.

As seen in Table 4, Geography Teacher

Table 4. Geography teacher candidates' methods to draw mind maps and their explanations.

Theme		Code	Participant	N	%	Sample Sentence
Geography teacher candidates' drawing methods for mind maps and their reasons for their preferences	By Computer	Easy	5,11,16,17,21,27 ,30,35,40,43,48, 50,53	13	24	21 "I prefer to prepare it on computer otherwise I'll need stationery" 35 "Unless you have hand skill or skill in drawing, preparing it manually will be difficult and time consuming, and it may not be aesthetical"
		Visual	10,13,15,19,20,2 5,28,29,33,41,42 ,51,55	13	24	10 "if I draw it by hand it won't be aesthetical." 29 "I can find and add any image I want on the web easily"
		Time	7,12,21,22,34,32 ,40,46,47,53,54	11	20	34"I wouldn't be able to complete it had I tried to draw it by hand" 47 "I draw it by hand first, but I could not fit it to the whole paper. Every time, I got stuck in some parts on the paper."
		Multimedia	3,4,18,22,36,40, 47,49,50,54	11	20	22 "I wanted to add a video related to monsoons…" 54 "Sound, color, and motion all can be used together"
		Other (Handy, High Definition, Cheap)	15,26,31,39,48,5 2,55	7	13	15 "I create the best effect by using the high definition photos from internet." 31 "I had difficulty in design when I prepared it by hand"
	By Hand	Retentive	1,2,6,8,14,23,24, 37,38,44	10	18	14 "if prepared by hand more details can be caught which facilitates retention." 38"the more effort I make on it, the more memorable it becomes"
		Other (More subjective, more creative)	2,8,18,36,37, 45	6	11	8"if I draw myself, I find more from myself in it" 45"…it is more challenging, but I prefer drawing it by hand so as not to limit the creativity"

Candidates' methods to draw mind maps are classified under 2 themes: "by computer and by hand". Candidates preferring to draw by computer (75%) are more than those preferring to draw by hand (25%). The codes consisting of their explanations for their preferences are respectively as follows: "Easy (24%), Visual (24%), time saving, multimedia, and other (Handy, High Definition, and Cheap)". Teacher candidates' views and their remarks accord with the results explored by Balım et al. (2006) and Çamlı (2009).

The codes for those preferring to draw mind maps by hands are "Retentive (18%) and other (11%) (more subjective, more creative)". These findings supports the results of the researches by Kıdık (2005), Yaşar (2006), and Kartal (2011). The teacher candidates think that hand drawings would be more memorable which corresponds to Buzan's (2009, p.77) view that "the technique prevents to get lost in a heap of notes, and enables to remember the necessary and important parts".

Suggestions and Conclusion

From geography teacher candidate's viewpoint, the contribution of mind maps to the learning environment can be classified in 3 categories. These categories are contribution to learning,

contribution to students, and contribution to material design.

In terms of learning, the technique is thought to pave the way for learning and ensure retentive learning. It is found influential in emphasizing the concepts and summarizing. It was described as a technique that enable organization, is eye-catching beside its capability of using a humoristic language. Also the power of mind maps to show relationships is another indicated characteristic of the technique. In this sense, the students are considered to learn Geography Course more easily and retentively with this technique. Especially, in establishing relationships between subjects and concepts, the technique is thought to be more effective while according preliminary information with newly acquired one. The ability of mind maps in summarizing the entire subject on a piece of paper only by means of colors, pictures, visuals and key words may facilitate learning. In terms of students, the technique is regarded to improve creativity, computer skills, keep away from memorization, improve social relations, and improve the capacity to render/interpret. In terms of materials, the technique's being visual, easy, practicable, enjoyable, time saving, and including multimedia were emphasized. Also it was shown as a good sample for beneficial use of computer.

Particularly, simplifying the concepts or subjects to a single word, and supporting it with colors, pictures, and visuals, turns the geography course regarded as "memorization-based" course into "a course that can be learned with fun and full understanding" in the eyes of the students. Taking the advantage of multimedia on computers, more visuals can be reached, and more creative expressions can be generated. Since it enables both hemispheres functioning while expressing thoughts, the technique can improve students' thinking skills. Every mind map may have traits from its creator. Looking at his map, the individual can seize upon what he has learned or what defects he has. In this context, it can be regarded as an alternative assessment technique (self-evaluation form/rubric). On the other hand, mind maps can be composed as group work as well as an individual task. Therefore, mind maps are thought to be effectual both in personal development and in improving social relations. It can be used to improve inter-class communication. Mind mapping technique can be regarded as an alternative to the mass of information that is given in plan texts, and time consuming. Geography Course, in particular, involves quite a lot concepts and subjects due to its content. Thus, employing this technique in Geography Course can helps students learn much information in shorter time easily.

Besides the positive views there are some negative views with lower frequencies. These are inexperience, addiction to computer, minds maps' (drawn on computer) leading to laziness, incomprehensibility of mind maps by the other people due to subjectivity, time consuming, confusion with concept maps. It is quite normal for the new born techniques to face some lameness not only in education but in all parts of life. Considering that mind mapping technique is employed in Geography Course for the first time, it is natural for students to have inexperience, too. The imperfections and lameness are expected to be recovered with through following implementations of the technique. There might be both advantages and disadvantages of utilizing computer programs in drawing maps. The diversity provided by multimedia can be taken as positive aspect while students' attempts to be content with what they have in their hands may lead to some negative effects. In this case, the mind maps may diverge from creativity and the goals. In order to avoid these unwanted effects, the mind map assessment scales can be utilized. In the section for scoring, students can be motivated to draw maps by explaining how the multimedia should be, and how it will be sored. In addition, those who would like to improve their hand skills can be advised to draw by hand and transfer it to computer. Such kind of practice may prevent the criticism that "computers prevent creativity, and lessen hands skills". Mind maps are pecilur to the individuals. Therefore, the drawing may express different meanings for an observer. However, individuals are advised to follow a hierarchy, ensure the flow of the ideas in clockwise, and if necessary, number the subsections. Following these advices will at least be useful to understand the main idea. Mind maps are often confused with concept maps. In order to recover this confusion, students can be subjected to the activites that helps them to make a distinction between these two techniques and go deeper into their details. In terms of the drawing program, the program's language being English, its limitations, incapability of its clipboard, and inability to adjust print size are the other negative aspects mentioned. In general, there is a great deal of mind map softwares. The students can be recommended to review these softwares, and draw their mind maps by the one which mostly suit them.

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