



INSTRUCTIONAL USE OF MIND MAP in KINDERGARTEN

ANASINIFINDA ZİHİN HARİTASININ ÖĞRETİM AMAÇLI KULLANIMI

Pınar BİLASA¹

¹Gazi University, Department of Education, Ankara, Turkey. Email: pınarbilasa@gmail.com

Abstract

This study is performed to test the employability of mind maps, which helps to enhance students' comprehension, in pre-school environments. Objective of the study is to present how much pre-school level students comprehend a visual course book using mind maps. The study has been conducted in Ankara Gazi University Foundation Private Schools in 2014-2015 academic years, autumn term with a total of 32 students attending nursery class (branches A/B). Since the circumstance present in the study is handled within the environment it is linked to and it tries to explain some consequences not known before within the relationship amongst them, this study is proven to be a qualitative research. As the result of the study, it was observed that use of mind maps also supports learning in pre-school level and it is feasible for this age group. Accordingly, it was inferred that use of mind maps in pre-school level is helpful to develop comprehension skills and suggestions were made for other disciplines on employing mind maps.

Keywords: Mind map, curriculum, nursery class, pre-school, teaching method.

Öz

Bu çalışma, öğrencilerin kavram anlayışlarını geliştirmeye yardımcı olan zihin haritalarının okulöncesi dönemde kullanılmasını ele almaktadır. Araştırmada amacı anasınıflı düzeyinde öğrencilerin görsel içerikli bir kitabı zihin haritası yoluyla ne kadar kavradıklarını ortaya koymaktır. Araştırma, Ankara Gazi Üniversitesi Vakfı Özel Okulları 2014-2015 eğitim-öğretim dönemi güz yarı yılında okulun iki anasınıflı (A/B) şubesinde bulunan toplam 34 öğrenci üzerinde yürütülmüştür. Araştırmada var olan durum bağlı bulunduğu çevre içinde ele alındığından ve bu çevre içinde bilinmeyen sonuçlar açıklanmaya çalışıldığından bu araştırma nitel araştırma olma özelliği göstermektedir. Araştırma sonucunda zihin haritasının okul öncesi dönemde anasınıflı düzeyinde de öğrenmeyi desteklediği, zihin haritası kullanımının bu dönem için de uygun olduğu görülmüştür. Bu doğrultuda anasınıflı düzeyinde de kavrama becerilerini geliştirmede zihinharitası kullanmanın faydalı olduğu sonucuna ulaşılmış, başka öğretiler içinde zihin haritalarının kullanılabilmesine yönelik önerilerde bulunulmuştur.

AnahtarKelimeler: Zihin haritası, eğitim programı, okulöncesi, öğretim yöntemi.

Introduction

As it is known, the organization of training programs require specific components. These components are subject matter, objectives, learning experiences, and evaluation. The components are organized to promote the acquisition of knowledge. The process of teaching the subject matter, such as reading/language arts, mathematics, and science on a daily and weekly schedule, would help the students achieve their goals and objectives. The curriculum is designed with a time frame when these goals and objectives are to be achieved. When implementing the curriculum, various strategies would be used in teaching the subject matter. The curriculum is transposed to the student but still retain the basic components (Rulloda, 2014).

Mind maps were developed in the beginning of 1970s by mathematician, psychologist and brain researcher Tony Buzan (Butuner & Gur, 2008; Tucker, Armstrong & Massad, 2014; Kokotovich, 2008; Polson, 2004; Brinkmann, 2014; Michalko, 2001). It is known that its first aim was to take notes as fast as possible and ensure that these notes to be catchy to the eye (Brinkmann, 2014). Due to this feature of it, it has the ability to enhance the knowledge production, classification, sorting, organizing and categorizing skills of the brain.

Teachers may enable their students to actively participate in the learning process by using mind mapping in the subjects they wish to teach. Through the mind maps that are formed for different subjects, continuity in the learning process may be ensured and subjects may be integrated by drawing connections between various subjects. In addition, mind maps may be used in the organization of the subjects to be taught or in the entrance to the program.

In Turkey, mind-mapping technique is frequently used as a means of teaching in primary school, middle school and higher education. On the other hand, the use of mind maps is not common on kindergarten level. The possible reason may be that while in pre-school, children don't have the adequate skills for using words, incidents or concepts like time-space yet. However, the current information regarding this period demonstrates that the knowledge and activities presented to the child that are in accordance with their developmental level have influence on their comprehension and are able to reflect the connections between concepts. The Mind Map can be applied to every aspect of life where improved learning and clearer thinking will enhance human performance (Buzan, 2015a).

As the result of the studies, it was observed that private kindergartens in Turkey have started to use mind mappings. However, no scientific research regarding the usage of mind mapping

in Turkey on this level has been found. On the other hand, some studies conducted overseas about how this implementation is used in pre-school have been found. For example; in Call's book "The Thinking Child" (2010), there are examples showing how mind maps are used in early period. Call expresses the implementation of a kindergarten teacher regarding mind maps as follows:



Figure 1. Mind-mapping implementation with the children.

Meanwhile, over in the nursery, the children are making a giant mind map about 'water' on the carpet. The word 'water' is printed in bold letters on a card in the centre of the map, and the children are working to organize pictures and related objects around it. These are joined with strips of card that indicate the relationship between concepts, such as a toy watering can being linked with a strip of card to a picture of a plant. Sponges feature in two places on this hands-on map; near the words 'bath' and 'washing up'. The teacher throws a new word into the discussion: 'absorb'. A round of applause celebrates the group's success as the mind map is complete for today (Call, 2010: 25).

As seen in the figure 1, the teacher is performing mind-mapping implementation with the children in kindergarten. In this mind mapping conducted in-group form, actual objects were used and main concept is linked to the objects with strips. In the figure, it is observed that children draw not only the actual objects, but also the concepts in their own minds that are related to water. Here, the usage of drawings demonstrates that the implementation of mind mapping is possible on kindergarten level.

Another implementation discussed in the book is as follows: In one nursery class the practitioner made real-life 3D mind maps with her class. On the carpet area they mapped their understanding of the topic 'Toys'. Using real toys, pictures and props, they categorized the toys and made links between concepts. Strips of card were used to link ideas. For example, an area of the mat was dedicated to wooden toys. A picture of an old-fashioned wooden tricycle was laid in that area, along with some wooden beads, bricks and toy cars. The word 'wood' was printed large in the middle of these items, along with a picture of a tree. At the end of the activity, all the labels and items were put in a box. In subsequent sessions, the mind map was laid out in slightly different ways with further items added. Children could choose to recreate the mind map themselves as an activity during the day. Later it was copied onto paper and

displayed. Mind maps need to be displayed where they are easily viewed and accessible. As new ideas emerge, they should be written directly onto the map, or on a post-it note. When children are mapping, you can be confident that they are making connections and building new concepts (Call, 2010).

In this example, it is observed that mainly actual objects are used in the implementation of mind mapping on kindergarten level. It is possible to say that the usage of actual objects, which is an effective way of materializing the figures present in children's minds, makes mind mapping more applicable on this level.

Another example encountered in the studies done is as such: On 2011, the mother of 5 year-old Corrent tells these regarding the mind map he has drawn (Draw Mean Idea, 2015):

It's amazing what is happening at home. Creating mind maps is becoming a kind of pleasant (and of course useful) pastime for all of us. I've probably been a bit boring these last weeks on the subject but now, boomerang is back. Both of my sons have started to create mind maps without me asking. It's amazing what is happening at home. Creating mind maps is becoming a kind of pleasant (and of course useful) pastime for all of us. I've probably been a bit boring these last weeks on the subject but now, boomerang is back. Both of my sons have started to create mind maps without me asking. Corrent is nearly 5 years old, created his first map last week-end about the family. Without any explanations or recommendations, he put the paper in landscape mode and started in the centre of the page. Then he drew some main branches and added what he does the best, drawings of family members. Here is his mind map:



Figure 2. A mind map example (Draw Mean Idea, 2015).

As can be seen in figure 2, 5 years old has drawn a mind map with the help of drawings. Therefore, it is possible to say that mind mapping may be implemented through drawings on this age level as well.

Images have the power to convey much more information than a word, a sentence or even an essay. They are processed instantly by the brain and act as visual stimuli to recall information. Better yet, images are a universal language which can overcome any language barrier. We are intrinsically taught to process images from a young age. According to Margulies (1991),

before children learn a language, they visualize pictures in their minds which are linked to concepts. For this reason, Mind Maps maximize the powerful potential of imagery (Buzan, 2015b). This is a mind map given as an example to this.

As is seen, drawings instead of words are frequently used in the mind maps on this age level.



Figure 3. Drawings used in the mind maps.

With these examples (figure 3), opinions of 3 professors specialized in pre-school education in Gazi University have been taken regarding the eligibility of the usage of mind mapping on kindergarten level. Their opinions are that the abstract concepts on children's minds on this level may be materialized through mind mapping with drawings. In addition, they mutually agreed that mind mapping supports the cognitive development of children with respect to comprehension, sorting and classification and therefore, may be used on this level as well.

Mind maps not only enable people to take notes quite fast, but also help them to correlate the concept and thoughts they have regarding a central concept of thought through the usage of the elements such as drawing, expression, figure, size, color. By this means, through enabling the active usage of right brain along with the left-brain, they carry the ability to be an effective brain- based visual technique (Evrekli, Inel & Balim, 2012) which operates the whole brain together (Kan, 2012).

In pre-school period, the child is quite enthusiastic to communicate and interested in the environment. Therefore, the techniques regarding the ways of teaching to children gain more importance especially in this period. Since mind maps are used for increasing the learning qualities of children, facilitating the ways they learn, making them enthusiastic towards learning, rendering their learning meaningful (Kefi, Celikoz & Erisen, 2013), their usage in this period is also possible. As is seen, mind maps are used on a large field thanks to their

advantages. Other advantages and their limitations on the other hand, are as follows (Brinkmann, 2014; Aslan, 2006; Saban, 2005; Townsend, 2003; Aydin, 2009).

Advantages of mind maps

- Mind maps help organize information.
- Mind maps can be used as a memory aid.
- Mind maps can assist with repetition and summary.
- Mind maps help to meaningfully connect new information with existing knowledge.
- Mind maps may introduce new concepts.
- Mind maps let cognitive structures of students become visible.
- Mind maps foster creativity.
- It is a strong graphic technique which reveals the whole potential of the brain. It robustly activates all areas of the brain and saves time for learning and remembering.
- It enables a bird's-eye view of the relationships, interactions and connections between concepts.
- It establishes a right-left brain connection and increases the learning skill by operating the two hemispheres of the brain in conformity.
- It facilitates the comprehension of both the whole and the part and enables to see the connections between the central concept and thoughts on main branches that were not recognized before.
- This technique includes not the long sentences, but keywords, images and symbols. This enables saving on time.

Limitations of mind maps

- Mind maps are individual graphic representations. Different people have different associations with the same topic, so they draw different mind maps.
- The correct grasp of the relationships represented in a mind map affords the right associations to the keywords. Hence, a person who wants to use a mind map should create it or be involved in its creation.

- In spite of its well-structured and ordered contents, a mind map may, at first, seem confusing.
- In a mind map, each main branch builds up a complex whole with its subbranches. As a rule, connections among the single complexes are not drawn. The clarity of a mind map is there by increased, but its representation of the existing relationships to a topic is incomplete.
- If cross-links are needed, the mind map technique should be modified, possibly by using colored lines. Depending on the goals, other graphical means of representation might be better.

After discussing the advantages and limitations of mind maps, information regarding how they are prepared is given below.

How are mind maps prepared?

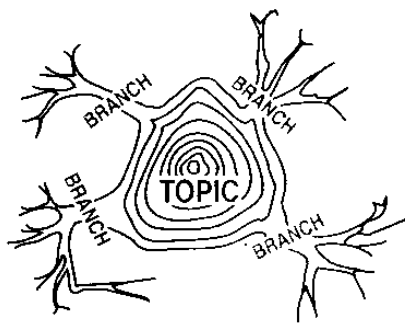


Figure 4. Preparing of the mind map (Brinkmann, 2014: 97)

As is seen on the figure 4 above, mind map generally includes key words, symbols and images (Aydin, 2009) that reach out from a main concept placed on the center to the details through main branches. For the formation of mind maps, which are very easy; an unlined paper, colored pencils, brain and imagination are enough (Butuner & Gur, 2008). Though it may seem complicated at first, this complication is removed by the usage of colors and figures in the mind maps. It would be adequate to follow the ways given below when preparing a mind map (Brinkmann, 2014; Buzan & Buzan, 2011).

- 1) Use a large unlined sheet of paper in landscape format. Placing and using the paper horizontally will facilitate drawing and reading the mind map.
- 2) The subject of the mind map is written or drawn on the center of the paper. The subject of the mind map should be displayed as eye-catching preferably with a colored drawing. If

the subject doesn't fit the drawing, the subject should be specified with a well-chosen key word.

- 3) From the topic, draw a main branch for each of the main ideas that are linked to the topic. Write keywords that denote the main ideas directly on the lines, using printed letters. The order of the branches is not important. If the ideas must be written in a specific order to facilitate understanding, number the branches or order them clock wise. If possible, write only one word, preferably a noun, per line. Since many of the words in texts are unnecessary, using a few meaningful keywords is sufficient to allow for one to remember the entire context.
- 4) Starting from the main branches, you may draw further lines (subbranches) for secondary ideas (subtopics), and so on. The order goes from the abstract to the concrete, from the general to the specific. Lines may be drawn thick or thin as per the significance of the key word. By this means, important concepts are emphasized and a hierarchy is drawn.
- 5) The sizes of the key words may be changed in order to increase the possibility of remembering and to show that the articles are sorted in hierarchy.
- 6) Use colors when drawing a mind map. Colors are one of the strongest tools that enhance creativity and memory since they attract interest and attention.
- 7) To your mind map, add images, sketches, and symbols, such as little arrows, geometric figures, exclamation marks, or question marks, as well as self-defined symbols. Drawings should be clear and comprehensible. A clear and comprehensible image will enable the thoughts to be straight as well.

This technique which is generally used in primary-school level in Turkey has slowly started to be used on kindergarten level. In this study, mind-mapping implementation was attempted through using a book including mainly visuals on kindergartens in order to promote a more common usage. The object of the study is stated below.

The object of the study

The object of the study is the usage of mind maps of all children in A/B branches of the kindergarten of "Gazi University Foundation Private Schools" placed in Ankara, in 2014-2015 education terms in comprehending a visually oriented book.

This study has the features of a qualitative research. Qualitative research is a method of research whose importance has been increasing in recent years in social, scientific and applied

fields such as education (Marshall & Rossman, 2011). This perspective which brings forefront the examination and comprehension of social facts within the environment they are linked to helps explaining various consequences that have not been recognized before within the connections they have with each other through the qualitative data collection techniques such as observation, interview and document analysis (Kaptan, 1995; Yildirim & Simsek, 2000). Since the circumstance present in the study is handled within the environment it is linked to and it tries to explain some consequences not known before within the relationship amongst them, this study is proven to be a qualitative research.

Mind-mapping is a fast and valid tool in analyzing qualitative data (Tattersall, 2014). In his study called “The Use of Mind Mapping in Teaching and Learning” done in 2009, Boyson examined the usage of mind maps in three different ways (Boyson, 2014):

1. Using Mind Maps as a note-making tool in developing the teacher’s own subject knowledge.
2. Using Mind Maps to present information to students in lessons.
3. Introducing Mind Mapping as a note-making format for students. The teacher presented the Mind Mapping technique to students and challenged them to produce a Mind Map of the module so far during the lesson. The students were also given a second attempt at the task as homework.

In this study, mind maps were utilized in the second way that Boyson discusses, which is the stage of presenting information to the students in lectures. As status determination is made in the research universe and subject selection was not made.

Limitations of the study

1. The study is limited to the week of 01-05 December 2014 within the Fall Term of 2014-2015 education term and to the theme “I’m Clean, Healthy, Happy”.
2. The study is limited to the total of 32 students who are in A/B branches of Kindergarten of Gazi University Foundation Private Schools located in Ankara.
3. The study is limited to the book “Follow it! A Germ’s Journey” which is in the weekly curriculum.
4. The study is limited to all of the domestic and foreign resources about the subject that were accessible.

Methodology

Data collection and analysis

Total number of students is 35. 3 students were absent in the date of the study. The study was conducted with 16 students (9 girls, 7 boys) in section A and 16 students (8 girls, 8 boys) in section B. The ages of the students who participated in the study are as follows.

Table 1.Theage of Students.

Birth date range	The number of students	Age
1 January 2008-31 December 2008	3 (19 December 2008, 10 October 2008, 08 Kasım 2008)	6
1 January 2009-31 December 2009	27	5
1 January 2010-31 December 2010	2 (02 March 2010, 06 March2010)	4

As is seen above, most of the students are 5 years old. They are followed by ages of 4 and 6. It is seen that 3 children who are 6 years old were born on the last months of 2008, 2 children who are 4 years old are born on the first month of 2010. That is to say, these children only have a few months of an age gap from the other children who have turned 5 years old.

The implementation was conducted as follows: The book “Follow it! A Germ’s Journey” which was planned to be read according to their weekly curriculum has been read. This book, written by Dr. Thom Rooke was translated to Turkish by Özlem Köroğlu and edited by Umut Hasdemir. This book is placed the popular science category in Turkey by The Scientific and Technological Research Council of Turkey (TUBITAK).

The reason why this book was chosen is that in the weekly curriculum of 01-05 December 2014, “I’m Healthy, Clean and Happy” theme (Gazi University Foundation Private Schools, 2014) was placed. The study was conducted on 1 December 2014 and therefore, the week started with this theme.

Then, mind maps were introduced to the children. Therefore, they were able to be informed about mind maps. After that, the concepts in the book were attempted to be reinforced by asking what, how, why, where questions so that the children would be able to reflect what they had understood from the things they listened to their mind maps (What flew? How did it fly? Why did it fly? Where did it fly to?).

The book consists of 24 pages. 21 pages include the subject. On 1st and 2nd pages there is a germ flying with a parachute, on 3rd page there is a sick child with a red nose, on 4th and 5th pages there are germs with an increased population, on 6th page there is a sneezing child and germs flying with parachutes, on 7th page there are germs spreading to the arm of the desk mate of the child because of the sneeze, on 8th page there are germs spreading to the candy of a girl who is sitting on the next desk, on 9th page there is the girl throwing the candy to the trash, on 10th page there is another girl who holds an unwashed apple in her hands, on 11th page there is a teacher who is washing the apple, on 12th page there is a computer keyboard, on 13th page there is a door nob, pencil, pencil sharpener and a germ flying across the world, on 14th page there is the computer keyboard again, on 15th page there is the kid named Jared rubbing his eyes and germs spreading to his tongue when he bites his nails, then Jared picking his nose, on 16th and 17th pages there are germs with an increased population and a human body showing how the germs enter into the body, on 18th page there is Jared sick and sitting in the school bus, on 19th page there is Jared sneezing without his mouth closed and germs spreading everywhere, on 20th page there is a city map showing how fast the germs are able to spread and on 21th page there are germs with suitcases and ready to go somewhere else.

While the book was being read, the drawings in the book were projected on the board with the help of a floodlight. After the reading was done, white A3 size papers and colored pencils were given to children as they were requested to hold the paper horizontally and draw what they have learnt from the book in the way that they designed in their minds. While doing that, they were reminded once more how to draw a mind map. After the mind-mapping activity which lasted for almost an hour, evaluation questions were asked to the children and the feedbacks were taken directly and orally in the form of yes and no. The five evaluation questions asked to the students are as follows:

1. Did you enjoy using a mind map?
2. Is it fun to learn with a mind map?
3. Is it interesting to learn with a mind map?
4. Do you think you have learnt better while using mind maps?
5. Do you want to learn other things by using mind maps again?

Finally, five questions regarding mind maps were asked to the teachers of the two branches and the feedbacks were again taken directly and orally in the form of yes and no. The five questions asked to the teachers are as follows:

1. Have you ever used mind maps before?
2. Do you think learning by this way motivated the students towards learning?
3. Are mind maps suitable for pre-school usage?
4. Do you think mind maps enhanced children's abilities to produce, classify, sort and categorize knowledge?
5. Do you consider using mind maps for other teaching?

Findings

The concepts drawn by the children in their mind maps are given in the table below.

Table 2. Concepts in the mind map.

Germ flying with a parachute in the middle of the drawing	25
Germ in the middle of the drawing	5
Sick child in the middle of the drawing	2
Pencil Sharpener	22
Tongue	19
Germs	19
Apple	18
Door nob	18
Computer Keyboard	18
Sick Child	14
Candy	13
Notebook	12
Nose	11
Arm With Germs	7
Finger	3
House	2

Concepts drawn by the children and the number of children that drew a specific concept can be seen in Table 2. While writing the concepts in this table, children were requested to explain their maps and the concepts they came up with during this process were noted name by name. According to the numbers given above, 25 of 32 participants drew a germ flying with a parachute, 5 drew germs and 2 drew a sick kid. 22 participants drew a pencil sharpener, 19 drew tongue and 19 drew germs with an increased population. The number of children who drew apple, door nob and computer keyboard is 18. It is followed by candy (13 children), notebook (12 children) and nose (11 children). The number of children who drew an arm, as a

reference to the germ spreading to the arm of the friend of the child while he sneezes is low compared to other drawings (7 children). The number of children who drew a finger with germs (3 children), a house (2 children) are observed as the lowest among the others. In addition, as the mind maps of the 2 children who are 4 years old (Figs. 18, 25) are examined; it was observed that they didn't differ from the others and in fact, they have done a very proper mapping. This situation may be interpreted in the way that though the children in this kindergarten are at different ages, their cognitive levels are relatively close to each other in this subject. Yet, if we look at the age differences, there are only a few months of an age gap from the age of 5. This may be considered as evidence that their cognitive levels are close. Generally, the concepts of germ, tongue, apple, door nob, computer keyboard, candy, sick child, notebook and nose were drawn more frequently by the children.

These findings may be evaluated as follows by taking the steps under the title "How are Mind Maps prepared?":

1. All of the children who participated in the study used an unlined, big (A3) paper horizontally. Placing and using the paper horizontally facilitated the drawing of the mind map.
2. 30 children drew a germ in the middle of the paper which is the subject of the mind map. 25 of them drew a germ flying with a parachute while 5 of them drew only a germ. Other two children drew a sick child (figs. 19, 24) in the middle of the paper. Here, we can say that a germ flying with a parachute stuck in children's minds more than the sick child. At the same time, it was observed that children drew the central concept colorful and attractive.
3. 30 children drew main branches for each of the main ideas related to the subject as from the main subject. One of the other two children drew a germ flying with a parachute in the middle of the paper but didn't draw any branches (fig. 8). Instead, he drew a house. The other child drew a sick but happy child and without drawing any main branches, he drew the other concepts related around this figure (Fig. 19). According to Kara and Akkaya (2014), the connection a child makes with the protagonists of the story; tale that he reads or listens takes him to a new, fictional world. From this point of view, it may be said that the book that is read revives different fictional figures in these children's minds. For the 30 children who drew main branches, there is no certain or fixed number of branches. Nonetheless, it was observed that 3 children enumerated these branches in a particular

order. One of these children gave the first number to computer keyboard and then enumerated sick child, pencil sharpener and door knob drawings (Fig. 4). The other drew nine main branches and germs around it and gave numbers to each of them (Fig. 12). The other child gave the first number to the drawing of the germ flying with a parachute, second number to pencil and pencil sharpener drawings and third number to the drawing of the sick child (Fig. 31). Based on this finding, it may be said that mind maps enhance the development of the ability of the student to categorize and classify.

4. It was observed that every drawing in the maps was in different size. This may be linked to the fact that children have drawn the concepts they remember more relatively bigger.
5. 24 of the 32 participants used different colors in their maps. Here, it is thought that these children preferred colors that are strong tools in enhancing creativity and memory since they attract interest and attention. On the other hand, 8 of them used only one color when drawing their maps. When asked of the reason, they told that the color they used is their favorite.
6. It was observed that the drawings of the participants were clear and comprehensible. According to Buzan, Buzan (2011), a clear and comprehensible image results in straight thoughts. From this point of view, it may be said that mind maps help the thoughts of the children to be more straight and clear.

Students answer given to the 5 evaluation questions.

In the direct answers orally obtained from children after the activity, children stated that they were quite happy for using mind maps, mind maps were fun and interesting, they have learnt germs better and they wished to learn other things by using mind maps. Here, it can be said that mind maps gain a lot of attention and facilitate comprehension.

Teachers answer given to the 5 evaluation questions.

In the answers of the questions asked to the teachers of two branches, teachers said orally that they have never used mind maps before although they have heard about it, mind maps motivate children towards learning, it is suitable to use them in kindergarten. In addition, they told that mind maps enhance the ability of children to produce, classify, sort and categorize knowledge and they think about using this method in other teachings as well.

Considering all of the findings obtained, it may be said that mind maps are quite helpful and applicable in the field from teachers' point of view. Even though the findings were obtained

from a small sample and based on two teachers, they demonstrate that mind maps may be implemented on kindergarten level as well.

Detailed results obtained in accordance with the findings of the study are as follows:

Results and Discussion

This study had a lot of positive results. They are categorized in two groups below:

A. Results regarding the implementation:

1. All of the students showed enthusiasm to mind mapping implementation.
2. Mind mapping implementation made the class environment more cheerful.
3. Though there were different age groups, mappings were drawn in accordance with the format of mind maps.
4. Most of the students drew a germ in the middle of the paper (25 out of 32).
5. Almost all of the students (30 children) drew main branches from the germ and portrayed the concepts they comprehended with different colors.
6. It was observed that students displayed good comprehension ability in the maps they drew for the fact that they obtained key words from the mind maps.
7. They were able to remember important information better. The most remembered concept was pencil sharpener (19 children), tongue (19 children) and germ (19 children). This was followed by apple and door nob, computer keyboard (18 children). The least drawn concept was house.
8. There was no difference observed between mind maps drawn by children at age of 4-5-6.

B. Results regarding the evaluation:

1. Results from the point of students: Students were happy to use mind maps and found mind maps fun and interesting. They learnt better by using mind maps and they wished to learn further things by using mind maps as well.

2. Results from the point of teachers: Teachers have heard of mind maps before but haven't used it. They thought that this technique motivates children towards learning, mind maps are applicable in kindergarten level and mind maps enhance the ability of children to produce, classify, sort and categorize knowledge. Teachers also stated that they were thinking of using mind maps in different teachings.

As a result, it was observed that the usage of mind maps on kindergarten level in pre-school period is quite applicable.

In the direct answers orally obtained from children after the activity, children stated that they were quite happy for using mind maps, mind maps were fun and interesting, they have learnt germs better and they wished to learn other things by using mind maps. Here, it can be said that mind maps gain a lot of attention and facilitate comprehension.

In the answers of the questions asked to the teachers of two branches, teachers said orally that they have never used mind maps before although they have heard about it, mind maps motivate children towards learning, it is suitable to use them in kindergarten. In addition, they told that mind maps enhance the ability of children to produce, classify, sort and categorize knowledge and they think about using this method in other teachings as well.

Considering all of the findings obtained, it may be said that mind maps are quite helpful and applicable in the field from teachers' point of view. Even though the findings were obtained from a small sample and based on two teachers, they demonstrate that mind maps may be implemented on kindergarten level as well.

Suggestions

Mind maps in pre-school education should be used more frequently by the teachers as a tool of teaching and for clarifying, organizing, connecting thoughts and knowledge about a subject in the mind of the child. Mind maps may be used on kindergarten level in teaching different subjects. Mind maps should be used different disciplines, in which performing in long time intervals, showing sample mind maps in order to facilitate the appliance of the technique in every lesson, decreasing the the lesson density on behalf of utilizing the mind maps more and making it more functional. Scientific studies similar to this study should be conducted regarding the attempts of the usage of mind maps on kindergarten level in other cities of Turkey.

References

Aslan, A. (2006). *The effect of mind mapping on the understanding summariz in gand remembering skill of informative texts fourt grade primay school student*. Master Thesis (Unpublished), Ankara: Gazi University.

- Aydin, G. (2009). *Effect of mind mapping technique on understanding what is listened to*. Master thesis (Unpublished), Erzurum: Ataturk University.
- Boyson, G. (2014, December 7). *The use of mind mapping in teaching and learning*. Retrieved from <<http://b701d59276e9340c5b4d-ba88e5c92710a8d62fc2e3a3b5f53bbb.r7.cf2.rackcdn.com/docs/Mind%20Mapping%20Evidence%20Report.pdf>>
- Brinkmann, A. (2014, December 8). Mind mapping as a tool in mathematics education. *Mathematics Teacher*, 96 (2): 96-101. Retrieved from <<http://www.optimind.be/blog/wp-content/uploads/2011/07/Mind-mapping-as-a-tool-in-Mathematics-Education-.pdf> dated>
- Butuner, S. O. & Gur, H. (2008). Teaching of angles and triangles by using vee diagrams and mind maps. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*. 2(1): 1-18.
- Buzan, T. & Buzan, B. (2011). *Mind maps*. Istanbul: Alfa Press.
- Buzan, T. (2015a, January 5). *What is the mind map?* Retrieved from <http://www.tonybuzan.com/about/mind-mapping/>>
- Buzan, T. (2015b, January 9). *Steps to creating a mind map: step 5. include images*. Retrieved from <http://imindmap.com/how-to-mind-map/>
- Call, N. (2010). *The thinking child. brain- based learning for the early years foundation stage*. Second Edition. Great Britain: MPG Books Ltd Printed.
- Evrekli, E. & Inel D. & Balim, A. G. (2012). The effects of the use of concept and mind map on students' conceptual understandings and attitudes toward science and technology. *Abant İzzet Baysal University Journal of Faculty of Education*, 12(1): 229-250.
- Gazi University Foundation Private Schools (2014, December 14). K12 net. Retrieved from <http://gazikoleji.k12net.com/SPSL.Web/#/ContainerPage>>
- Draw Mean Idea. (2015, January 9). *It's all about the thinking process and a fantastic way of visualising it with Mind Maps*. Retrieved from <http://www.drawmeanidea.com/2011/06/any-age-any-subject-most-important.html>>

- Kan, A. U. (2012). *The effects of using individual and group mind mapping on students' academic achievement, retention and affective characteristics in social studies course*. Ph.D. Thesis (Unpublished), Elazığ: FiratUniversity.
- Kaptan, S. (1995). *Scientific research and statistical techniques*. Ankara: Bilim Press.
- Kara, O. T. & Akkaya, A. (2014). *Fictional children's literature products dimensions that affect children's imagination and creativity*. Children's Literature Studies I. Adana: Karahan Press.
- Kefi, S., Celikoz, N. & Erisen, Y. (2013). Preschool teachers' levels of using the basic science process skills. *Journal of Research in Education and Teaching*. May 2(2): 300-319.
- Kokotovich, V. (2008). Problem analysis and thinking tools: An empirical study of non-hierarchical mind mapping. *Design Studies*, 29 (1): 49-69.
- Marshall, C. & Rossman, G.B. (2011). *Designing qualitative research*. Fifth Edition. ABD: SAGE.
- Michalko, M. (2001). *Cracking creativity: The secrets of creative genius*. Berkley: California Ten Speed.
- Polson, K. (2004). *Mind mapping in learning and teaching: Pupil and teacher perspectives*. Teacher Researcher Programme 2003/2004. Galashiels Academy, Scottish Borders.
- Rulloda, R. B. (2014, December 12). *Curriculum: Which Approach?* Retrieved from <<http://files.eric.ed.gov/fulltext/ED507709.pdf>>
- Saban, A. (2005). *Multiple intelligence the oryand education*. Ankara: Nobel Press.
- Tattersall, C. (2014, December 11). *Mind mapping in qualitative research*. Research& Development Hywel. Retrieved from <[DdaNHSTrust.https://www.rcn.org.uk/__data/assets/pdf_file/0020/253334/2009_RCN_research_6.8.2.pdf](https://www.rcn.org.uk/__data/assets/pdf_file/0020/253334/2009_RCN_research_6.8.2.pdf)>
- Townsend, R. (2003). *Living wealth*. Translated by Pelin Siral. Istanbul: Sistem Press.
- Tucker, J. & Armstrong, G. & Massad, V. (2014, December 25). Profiling the mind map user: A descriptive appraisal. *Journal of Instructional Pedagogies*, 2: 1-13. Retrieved from <<http://www.aabri.com/manuscripts/09264.pdf>>

Yildirim, A. & Simsek, H. (2000). *Qualitative research methods in social sciences sosyal*. 5th Edition. Ankara: Seçkin Press.

Attachment



Figure 4. Germ flying with a parachute in the middle of the drawing, computer keyboard, sick child, pencil sharpener, door nob



Figure 8. Germ flying with a parachute in the middle of the drawing, house



Figure 12. Germ flying with a parachute in the middle of the drawing, and 9 units flying germs



Figure 18. Germ flying with a parachute in the middle of the drawing, sick child, flying germs, germs into the nose, germ on the tongue



Figure 19. Two sick friends, pencil sharpener, computer keyboard, apple, germs on the tongue



Figure 24. Sick child in the middle of the drawing, germ, friend's arm, pencil sharpener, apple, door nob, computer keyboard



Figure 25. Germ flying with a parachute in the middle of the drawing, pencil sharpener, candy, apple, notebook, germ, computer keyboard

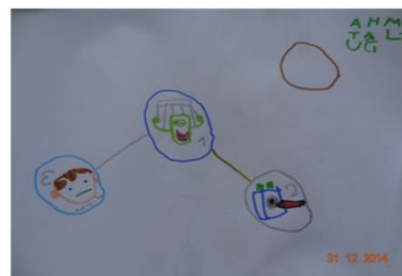


Figure 31. Germ flying with a parachute in the middle of the drawing, pencil sharpener, sick child