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The Effect of Using Mind Mapping Technique in Violin Training on the Cognitive, Psychomotor Skills and Attitudes of the Students *

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Abstract

In this research, the attitudes of the students towards mind mapping used in violin lessons was determined, analyzing the effect of the use of the mind mapping technique in violin education lessons on the cognitive and psychomotor skills of the students. 20 violin students who study at Bursa Zeki Müren Fine Arts High School were enrolled to the research, using the "Pretest-Posttest Control Group Experimental Design". The research employed "Test of Cognitive Field Evaluation" and "Performance Rating Scale", and random experimental and control groups were established according to the pretest scores. The experimental practice phase of the study was designed as six weeks (12 hours of course) and was carried out with each student individually. The violin education lessons of the students in the experimental group were conducted with the mind mapping technique, while the violin education lessons of the students in the control group were conducted with the traditional methods. The cognitive and psychomotor skill scores of the groups were compared upon the posttest measurements performed following the experimental study. 2 months after the posttest measurements, the "Test of Cognitive Field Evaluation" was reapplied in order to determine the retention of the cognitive skill levels of the students. At the end of the study, the attitudes of the students in the experimental group towards the mind mapping technique were determined by means of the "Attitude Scale towards the Mind Mapping Technique Used in Violin Lessons". In line with the findings of the research, it was concluded that the violin education lessons conducted with the mind mapping technique are effective on the development of the cognitive and psychomotor skills of the students, and mind mapping increases the retention of the theoretical knowledge learned in the violin education lessons. Nevertheless, it was determined that the students developed a positive attitude towards the use of the mind mapping technique in the violin education lessons.

Keywords

Music education
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Violin education
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Psychomotor skill
Attitude

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Introduction

Today's cognitive learning theories are intended to reveal the principles and rules which determine the process in learning and the properties of such processes, and the functions of learning. Information processing theory is one of the theories addressing learning in cognitive terms. According to this theory, firstly physical stimulants reaching the sense organs enter into the nervous system by means of sensory recording in the realization of learning. The information representing the original stimulant in the sensory recording is transferred to short-term memory, is coded by means of mental repetition, and is sent to the long-term memory to be remembered again when required (Senemoğlu, 2007, pp. 265-269).

The individual should compare the new knowledge with the existing knowledge, and establish the required links between the new and existing knowledge, in order to build new knowledge by means of making the knowledge retentive. The brain naturally ensures the performance of these processes (Balım, Evrekli, & Aydın, 2006, p. 2). Neuroscientific researches recommend using both hemispheres of the brain in coordination to achieve a fast and retentive learning (Uluorta & Atabek, 2003, p. 300).

Leonardo da Vinci is considered as the most successful person of the last one thousand years in the fields of painting, sculpture, physiology, general science, architecture, mechanics, anatomy, physics, invention, meteorology, geology, engineering, and aviation, which he performed using the both sides of the brain efficiently. Vinci's own scientific notebooks, in which he gathered his secret powers that spread over that much fields, resemble three-dimensional paintings and drawings; and his painting masterpieces resemble architectural plans involving mathematics, logic, and precision measurements (Buzan, 1984, p. 15). Similarly, it may also be suggested that one of the basic grounds that led Einstein, Edison, and Darwin to success was that these genius people expressed the subjects that they selected in their notebooks visually with diagrams and maps. The tree-like diagrams that stand out in Darwin's notebooks enabled Darwin to develop his opinions on the theory of evolution, to think in different perspectives simultaneously, and to synthesize opinions that seems to be independent from each other (See. Figure 1). Galileo achieved a revolution in science, visualizing his ideas with diagrams and some drawings, while his contemporaries were using traditional verbal and algebraic methods (Michalko, 2001, p. 51).

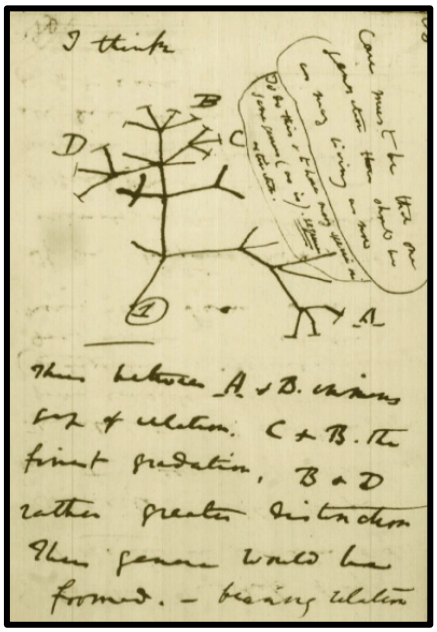


Figure 1. Darwin's Note-Taking Method (Buzan, 2001, p. 49)

The traditional teaching methods ignore the natural learning process of the brain and causes the student to memorize the information. It is possible to enable the students to learn meaningfully by

structuring the knowledge of the students by means of a teaching performed with learning strategies (Demirel, Erdem, Koç, Köksal, & Şendoğdu, 2002, p. 125). Learning strategies are the thoughts and behaviors with which the students are design for the effects of the coding processes. Such thoughts and behaviors are beneficial for the learners to choose, adopt, organize, and structure the new information (Weinstein & Mayer, 1986, p. 315).

Multimedia learning occurs while people create mental representations of the materials such as images, photographs, animations, and videos with the words they sense verbally or in printed texts. Briefly, multi-learning media means the design of multimedia presentations with images to create mental representations of people. Multimedia means using words and images together to present a material. Information is collected and structured in the multimedia learning process. Here, the question is meaningful learning. Because, the outputs of meaningful learning depend on the cognitive activities of the learner, rather than his/her behavioral activities during learning (Mayer, 2001, p. 3; Mayer, 2005, pp. 2-3).

Besides, according to the dual coding theory (Sadoski & Paivio, 2001, p. 2), dating back to the cognitive developments between the years 1960 and 1970 and formed according to the multimedia learning theory, there is a similarity, a parallelism, and continuity between perception and memory, and behavioral skills and cognitive skills (Sadoski & Paivio, 1994; as cited in Aldağ & Sezgin, 2003, p. 125). According to this theory suggested by Paivio, when verbal content is presented together with visual content, learning will be more efficient and effective (Aldağ & Sezgin, 2003, p. 121).

While establishing the subject of this research, the starting point was the need for the students to have information on the musical pieces they play, to increase their funds of knowledge in the field of music, and to reflect the cognitive skills that they obtained on the behavior of playing an instrument, upon seeing the basic structures of the music over the musical pieces studied during the instrument education. In this direction, the idea of the fact that mind maps to be created basing on student activity with the musical pieces studied can be used as an effective educational appliance to increase the cognitive skills of the students and, by this way, to develop their performance skills arose.

Mind Map

The mind mapping technique, developed by the English mathematician, psychologist, and brain researcher, Tony Buzan, in the 1970s, can be defined shortly as transferring information to papers with the help of keywords and symbols (De La Cruz-Bechtel, 2008, p. 58). Mind maps, shaped by natural constructs such as libs of a leaf, branches of a tree, or cell structures of the brain, are considered as an effective instrument of way of thinking and to be closely associated with the operating mechanism of our brains, in that they are holistic, convenient for mentality, and in terms of characteristics towards all of the cognitive skills (Buzan, 2009, p. 22, 2007, pp. 138-139; Aköz, 2011, p. 23).

The advantages of the mind maps, which facilitate seeing relationships and links by keeping the attention on image, compared to the standard not taking techniques, can be listed as follows (Buzan, 2009, pp. 19-20; Murley, 2007, p. 176):

- Mind maps have a design spreading from the center and ensure seeing the links between preliminary information and new information simultaneously, comprising the entire main topic and the subtopics and ideas associated with the main topic.
- All relevant topics can be presented in a single mind map.
- Main idea is defined much more clearly in mind maps.
- Ideas take part in the center of mind map distinguishably in the order of priorities.
- As the links between key concepts are easily distinguishable, ideas and concepts are associated easily.
- Information can be reviewed fast and efficiently.
- It is possible to add new concepts to the structure of mind map.

- Each mind map is unique with the use of emphasis, image, and colors, which facilitates keeping mind maps in memory.
- As summarization is more flexible in mind maps, creativity is encouraged.

According to Buzan (2009, p. 30), a mind map represents a kind of thought journey, and it is a must to do some planning beforehand for its success. This shows that the technique of mind mapping is not a random not taking technique; on the contrary, it has a structure that is preplanned and that can be developd continuously towards the purpose desired to be attained.

Anyone who wants to create a mind map can benefit from the following instructions (Buzan, 2007, pp. 162-165; Wycoff, 1991, p. 45):

- Rotate horizontally the sheet you use. This will provide you with freedom of expression without the limitation of narrow measurement.
- Have an explicit opinion on the topic you aim or you want to solve.
- Place the graphical representation that constitutes the focal point of a problem or an information in the center of the page. The important point in mind maps is to create an image that will activate your ideas as the starting point.
- Make use of colored pens. Colors are quite important for emphasis, structure, pattern, and creativity.
- Try to use at least three colors and create your own color code. Colors can be composed hierarchically or on pattern basis, or can be used to emphasis certain points.
- Draw a series of thick lines spreading outwards from the central view. They will be the fundamental branches of your mind map that will support your thoughts like branches of a tree.

These fundamental branches must be bound firmly to the central view. Because, our brain and mind work with associations

- Curve your lines. Curved lines are more interesting and catchy than straight lines for our eyes and brains.
- Add images and symbols to your mind map. They are used to emphasize ideas and to establish links with the other ideas stimulating the mind.
- Write a keyword for each branch so as to associate with the topic. This allow defining the core of the topic while helping make it more possible to store the associations in our brains.
- Add several empty branches to your mind map. Your brain will want to add something to them later.
- Create second or third level branches for your secondary thoughts. Second level branches are linked to the fundamental branches, and third level branches are linked to the second branches and this goes on in this way. Association is the most important factor in this process.
- You can include themes that answer the questions of “who, what, where, why, how” for the topics, situations, or words you select for each branch.

Figure 2. shows an example of a mind map built by Benjamin Zander, the Conductor of the Boston Philharmonic Orchestra over 9th symphony of Beethoven.

Figure 2. Example of Mind Map of Benjamin Zander (Buzan & Buzan, 1994, p. 163)

Relevant Literature

No national or international study on the use of the mind mapping technique in the field of music education was found as a result of the literature search made during the execution this research. Therefore, this is the first study to have been conducted in the field of music. As a continuation of this study, Selçuk (2015) conducted the master's study named "Effect of using mind mapping technique in music lessons on the achievement and attitudes of the student". Selçuk studied with a total of 37 students who were studying at 3rd grade of primary school and divided into experiment and control groups. The lessons with the experiment group were conducted with mind mapping technique, while the lessons of the control group were conduced with traditional methods. During the phase of implementing the mind mapping technique in the study, six lesson plans of one each hour were generated in line with the subject of "The Instrument We Know", and the students were intended to achieve the gains in the curriculum for six hours in total. During the last two weeks of the implementation, the students were divided into four groups, and created mind maps of the subjects they had learnt. As a result of the research, it was found that there was a significant difference between the pre-test and post-test scores of the students in the experiment group who studied with mind mapping. In addition, it was observed that the students played an active role in the lessons during the process of implementation, and they developed their senses of sharing and responsibility, enhancing their social relationships by means of group mind maps. In conclusion, this research revealed that the mind mapping technique could be a technique of teaching appropriate for implementing during the in-class activities of the music education lessons (Çoban ve Tokatlı, 2017).

As a result of the literature search, it was found that the national studies addressing the use of the mind mapping technique are particularly on Science, Social Sciences, Turkish Language, Mathematics, English Language, and Geography lessons. Besides, the foreign studies are generally on the fields of Medicine, Science, and Mathematics.

Kıdık Elgin (2005) and Yaşar (2006) concluded as a result of their studies conducted with primary education students that the use of the mind mapping technique in Science lessons increases the achievement of the students. Similarly, Evrekli (2010) and Bastem (2012) revealed that the technique of mind mapping they used in science and technology teaching is effective in increasing the academic

achievement. Besides, in the study by Çamlı (2009), computer-aided mind mapping technique was found to be more effective, compared to the technique of mind mapping applied on paper. Bütüner (2006), Yılmaz (2012), Aslan (2006), and Yetkiner (2011) concluded in their studies, addressing the effect of using mind mapping technique in Mathematics, Turkish Language, and English Language lessons on the achievement of the students, that mind mapping is more effective, compared to the traditional teaching and it has an effect on retention. Kan (2012) compared the effect of individual and group mind mapping techniques on achievement with the traditional method in her study on Social Sciences lesson. The study results revealed that experimental II. group that used group mind mapping was more successful than the control group. It was offered that both individual and group mind mapping should be used more in the first and second stages of the elementary education. Kahveci (2004) concluded in her study conducted with 3 students with low vision at the level of 7th grade that the teaching practice carried out with the teaching material of creating mind maps presented with direct teaching method to the students with low vision is highly effective. Aydın (2009) and Şeyihoğlu and Geçit (2012) determined as a result of their studies conducted with teacher candidates that the technique of mind mapping is effective in achievement. In the studies, the teacher candidates adopted a positive attitude towards the mind mapping technique and stated that it is more pleasant to teach lessons in this way.

Farrand, Hussain, and Hennessy (2002) revealed that the experimental group studying with mind maps had higher recalling skills; however, they concluded that the motivation levels of the control group students were higher. This was explained by the fact that the students approached with prejudice towards the technique that they just learned and that they had adopted the traditional techniques further. Budd (2004) created two in-class activity examples for the technique of mind mapping with a group of students studying at the University of Minnesota, and applied them in his lessons. According to Budd, mind mapping is a technique that must be invoved in active learning exercises. Treviño (2005) compared outlining and mind mapping techniques in a study that he performed with students in the age group of 11-14. The results of the research suggested that the achievement of the group making summarization was higher, compared to the group of mind mapping technique. According to Trevino, it is possible to present many different factors constituting this situation. Some of them are that the students were unfamiliar with the technique of mind mapping, the teachers didn't have sufficient knowledge and were not prepaired for this topic, and the students had just got out of the concrete operational stage according to the cognitive developmental stages of Piaget. However, it was determined according to the attitude scale applied that the students exhibited positive attitudes towards the technique of mind mapping and they found this method enjoyable. Moi and Lian (2007) concluded as a result of their project study, in which they aimed to increase the achievement of students in Chinese language teaching with the technique of mind mapping, that the mind mapping technique develops the comprehension skill. Abi-El-Mona and Abd-El-Khalick (2008) conducted a study to determine the effect of the technique of mind mapping on the achievements of the 8th grade students in the field of science, and concluded as a result of the research, in which they examined the relations between the mind maps made by the students and their conceptual perception, that mind map is an effective technique of learning. Ismail, Ngah, and Umar (2010) determined in their study that peer-learning method applied using the technique of mind mapping for the logical thinking levels of the students is an effective cognitive strategy.

Aim and Importance

Musical instrument education, taking an important place in the expression of the art of music, involves a process of education in line with achieving the aims that are targeted as a resultant of the cognitive, affective, and psychomotor skills. In this process, it is aimed that the students can recognize many terms and concepts of the field of music and have sufficient information on the musical pieces, observing the fundamental structures of the music over the musical pieces they play. Besides, it is expected from the students to be able to perform qualified voicing by means of developing their skills of playing instruments and to have the experience of exhibiting an efficient performance, as one of the most fundamental targets of the musical instrument teaching.

The mind mapping technique in violin education lessons was considered worth researching as an effective method of teaching for the students to view the music integrally and to reflect the cognitive skill behaviors they gained to their psychomotor skill behaviors, at the point of meeting these expectations. In the process of the research, there was no study found to have been conducted on the use of mind mapping technique in music education at national and international level. Thus, this study is considered important for it is the first study to be conducted on music education and its subfield, musical instrument education. Particularly, it is considered that this study will serve as a model for the other music education field studies based on the performance skill. In addition, the fact that the mind mapping technique is an approach that can be benefited from in music education alone or together with other educational instruments in the literature increases the importance of this research.

The aim of this research is to address the effect of the violin education lessons conducted with the mind mapping technique on the cognitive and psychomotor skills of the students. In accordance with this general aim, the problematic of this research is formed by the seeking of the question "What is the effect of the violin education lessons conducted with the mind mapping technique on the cognitive and psychomotor skills of the students?".

Research Questions

1. What are the cognitive skill levels of the violin lessons of the experimental and control groups before and after the implementation?
2. What are the psychomotor skill levels of the violin lessons of the experimental and control groups before and after the implementation?
3. What are the genre and form knowledge of the pieces they played of the experimental and control groups before and after the application?
4. What is the development of the experimental group during the experimental study process?
5. What is the level of permanency of the information learned in the experimental and control groups?
6. What is the attitude of the experimental group towards the mind mapping technique used in the violin lessons after the application?

Method

Research Model

In this research, the "Pretest-Posttest Control Group Experimental Design" was used in order to determine the effect of the mind mapping technique used in violin education lessons on the cognitive and psychomotor skill levels of the students and on the retention of the learned knowledge. Random experimental and control groups were established according to the pretest scores of the students in order to measure the effect of the violin education lessons conducted with the technique of mind mapping on student achievement. The mind mapping technique was used in the violin education lessons conducted with the experimental group; while the current traditional methods of violin education were used in the lessons conducted with the control group. The cognitive and psychomotor skill levels of the students were compared by means of the posttest applied to the groups as a result of the experimental practice, and finally the retention of the cognitive field knowledge the students learned was measured by means of retest. The attitudes of the experimental group towards the technique of mind mapping used in the violin lessons were determined by means of the attitude scale.

Study Group

The study group of the research was constituted by a total of 20 violin students studying at 10th and 11th grades at Bursa Zeki Müren Fine Arts and Sports High School. Random experimental and control groups were assigned in line with the results of the pretest measurements to achieve group equivalency. It was proved by means of Mann Whitney U Test that the experimental and control groups were equivalent.

Data Collection Instrument

Test of Cognitive Field Evaluation: This test was prepared to measure the cognitive achievements of the students in violin lesson (See. Appendix 2). The test was composed of a total of 55 questions for measuring the concepts (bow techniques, musical expression terms, loudness terms, speed terms, form knowledge, composer, characteristics of the era, etc.) in both of the violin pieces determined to be used in the pretest and in the posttest in line with the learning outcomes towards the cognitive field in the violin lesson curriculum. The validity of the test was proven by consulting expert opinion. The test was applied to all of the students (N=72) of the string instruments class who were studying at the school, and the reliability of the test was measured by means of the "Cronbach's Alpha" statistics test. All the questions were made ready to use in practice as a result of the validity and reliability studies.

Performance Rating Scale: This scale was prepared in order to measure the instrument playing skills of the students and to determine their levels of knowledge about the musical pieces they would play (See. Appendix 3). The scale was arranged as two sections as "Performance-Psychomotor Field Rating Scale" and "Performance-Cognitive Field Rating Scale" in order to measure the psychomotor and cognitive field skills of the students during their performances. The performance rating scale was arranged as 5-point rating format representing 0-19, 20-39, 40-59, 60-79, and 80-100 point intervals.

a) Performance-Psychomotor Field Rating Scale: The scale was prepared revealing the main learning outcomes in the violin lesson curriculum and the skills that are found necessary for performing the studied musical pieces, and it has a total of 18 learning outcomes under 6 basic topics.

b) Performance-Cognitive Field Rating Scale: The scale was created with the aim of determining the students' levels of knowledge about the musical pieces they would play, and it has a total of 5 learning outcomes that involve genre and style fields.

Violin Lesson Student Observation Form: It was developed with the aim of following and evaluating the progress of the experimental group students during the process of the experimental study (6 weeks / 12 hours of course) (See. Appendix 4). The observation form contains the learning outcomes in the performance rating scale and it was arranged as 5-point rating format.

Attitude Scale towards the Mind Mapping Technique: The "Attitude Scale towards Mind Mapping Technique Used in Mathematics Lessons" developed by Gür and Bütüner (2006) in order to determine the attitudes of the experimental group towards the mind mapping technique was adapted to violin lesson (See. Appendix 5). The scale was designed as Likert-Type 5-point rating format and it has a total of 16 items, 10 being positive and 6 being negative.

Musical Pieces Used in the Process of Research: Two musical pieces were determined to be used for the pretest and the posttest in the process of rating the cognitive and psychomotor instrument skills of the students. While choosing the musical pieces, it was noted that they have certain concepts and terms that are capable of enabling the students to develop their cognitive and psychomotor skills. A learning outcomes table was created to be used in the experimental study of the selected musical pieces. The table was divided into two sections and learning outcomes of the pretest musical piece were entered in the first section, while the learning outcomes of the posttest musical piece were entered in the second one (See. Appendix 1). All of the concepts and terms in the table were included in the rating tests and scales used during the research.

Pretest

Application of the Test of Cognitive Field Evaluation (Week 1): The test contains the basic concepts and terms towards cognitive field and was applied to all of the students. The test data was used in the reliability study of the test and to be evaluated as the pretest findings of the study group.

Study of the Students on the Musical Piece to be used in the Pretest (Weeks 2 and 3): The students in the study group studied on the pretest musical piece given for two weeks without any intervention by the teachers of the lesson.

Application of the Performance Rating Scale (Week 4): After the students studied on the musical piece given, the psychomotor field and cognitive field skills of the students were measured by a total of five observes together with the researcher, using the "Violin Lesson Performance Rating Scale".

Creation of the Experimental and Control Groups (Week 4): Random experimental and control groups were established according to the results of the pretest that was conducted.

Experiment

Introduction of the Mind Mapping Technique (Week 5): The experimental group was given a presentation that was prepared with computer assistance, and the mind mapping technique was introduced to the students, referring to the relevant books. Following the introduction, the students were divided into two groups, and they prepared mind maps on a topic that they determined (See. Figure 3 and 4). At this phase, the students were given guidance.

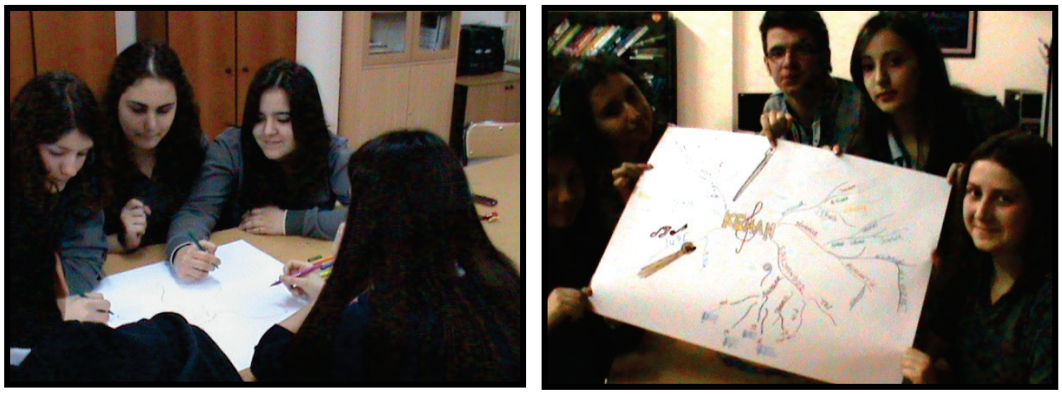


Figure 3 and 4. Introduction Activity for the Mind Mapping Technique

Studying on the Posttest Musical Piece (Weeks 6, 7, 8, 9, 10, and 11): The musical piece determined to be used in the posttest was given to the experimental and control group students simultaneously, and was studied in the lessons for 6 weeks (12 hours of course). The experimental group students studied on the musical piece determined, with the mind mapping technique during the lessons conducted by the researcher (See. Figure 5 and 6; See. Appendix 6). At the same time, the control group students studied on the same musical piece, with the traditional methods during the lessons conducted by a total of 3 violin teachers working at the school. The lessons conducted with the mind mapping technique in the experimental group were recorded with a camera.

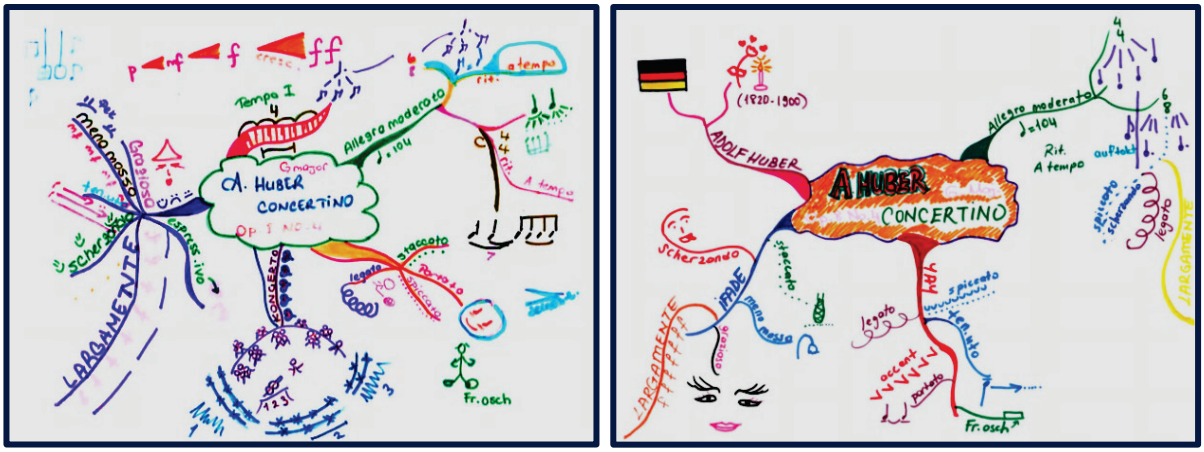


Figure 5 and 6. Examples of Mind Maps of the Students Regarding the Musical Piece Studied

Posttest

Application of the Performance Rating Scale (Week 12): At the end of the lessons, the psychomotor and cognitive field skills of the students were rated with the "Violin Lesson Performance Rating Scale" by a total of 5 observes together with the researcher, as it was done in the pretest. The performances of the students were recorded by a camera.

Application of the Test of Cognitive Field Evaluation (Week 12): The Test of Cognitive Field Evaluation, constituting the concepts and terms (bow techniques, musical expression terms, loudness terms, speed terms, form knowledge, composer, characteristics of the era, etc.) of the musical piece studied, was applied to the study group.

Application of the Attitude Scale for the Mind Mapping Technique used in Violin Lessons (Week 13): The scale that was prepared was applied in order to determine the attitude of the experimental group students towards the mind mapping technique, as a result of the experimental study.

Retention Test

Application of the Test of Cognitive Field Evaluation: The Test of Cognitive Field Evaluation, which was applied in the pretest and in the posttest, was reapplied 8 weeks after the posttest in order to test the retention at the cognitive skill levels of the experimental and control group students.

Results

Results on the Test of Cognitive Field Evaluation

Table 1. The Results of the Mann Whitney U Test performed According to the Pretest Scores of the Test of Cognitive Field Evaluation of the Groups

Group	n	Rank Average	Total Ranking	Mann Whitney U	Z	P
Experimental	10	10.60	106.00	49.00	-.076	.940
Control	10	10.40	104.00			

According to Table 1, there is no significant difference between the Test of Cognitive Field Evaluation pretest scores of the experimental and control groups (p>.05). This result shows that the cognitive skills of the experimental and control groups were equivalent before the application.

Table 2. The Results of the Wilcoxon Signed Ranks Test performed according to the Pretest-Posttest Scores of the Experimental Group Test of Cognitive Field Evaluation

Experimental Group Pretest-Posttest	N	Rank Average	Total Ranking	Z	P
Negative Rank	0	.00	.00		
Positive Rank	10	5.50	55.00	-2.807	.005
Equivalent	0	-	-		

Table 2 shows that there is no significant difference between the Test of Cognitive Field Evaluation pretest scores and posttest scores of the experimental group (p<.05). This reveals that the violin education lessons conducted with the mind mapping technique increased the cognitive skills of the experimental group positively.

Table 3. The Results of the Wilcoxon Signed Ranks Test performed according to the Pretest-Posttest Scores of the Control Group Test of Cognitive Field Evaluation

Control Group Pretest-Posttest	N	Rank Average	Total Ranking	Z	P
Negative Rank	3	6.00	18.00		
Positive Rank	7	5.29	37.00	-.970	.332
Equivalent	0	-	-		

According to Table 3, there is no significant difference between the Test of Cognitive Field Evaluation pretest scores of the control group (p>.05). Accordingly, it was determined that the violin education lessons conducted with the current teaching method did not have much effect on increasing the cognitive skills of the control group.

Table 4. The Results of the Mann Whitney U Test performed According to the Posttest Scores of the Test of Cognitive Field Evaluation of the Groups

Group	n	Rank Average	Total Ranking	Mann Whitney U	Z	P
Experimental	10	13.20	132,00	23.000	-2.044	.041
Control	10	7.80	78.00			

According to Table 4, there is a significant difference between the Test of Cognitive Field Evaluation posttest scores of the experimental and control groups (p>.05). This result shows that the experimental group students studying with the mind mapping technique gained more cognitive skills towards their fields, compared to the control group students.

Results on the Performance-Psychomotor Field Rating Scale

Table 5. The Results of the Mann Whitney U Test performed According to the Pretest Scores of the Performance-Psychomotor Field Rating Scale of the Groups

Group	n	Rank Average	Total Ranking	Mann Whitney U	Z	P
Experimental	10	10.20	102.00	47.00	-.227	.821
Control	10	10.80	108.00			

As Table 5 shows, there is no significant difference between the Performance-Psychomotor Field Rating Scale pretest scores of the groups (p<.05). This reveals that the experimental and control groups were equivalent in terms of the Performance-Psychomotor Field Rating Scale pretest scores. Thus, it was determined that the psychomotor instrument skills of the experimental and control groups were similar before the application.

Table 6. The Results of the Wilcoxon Signed Ranks Test performed according to the Pretest-Posttest Scores of the Performance-Psychomotor Field Rating Scale of the Experimental Group

Experimental Group Pretest-Posttest	N	Rank Average	Total Ranking	Z	P
Negative Rank	0	.00	.00		
Positive Rank	10	5.50	55.00	-2.803	.005
Equivalent	0	-	-		

Table 6 shows that there is a significant difference between the pretest and posttest scores of the Performance-Psychomotor Field Rating Scale of the experimental group (p>.05). This reveals that the mind mapping technique used in the violin education lessons contributed positively to the development of psychomotor instrument skills of the experimental group.

Table 7. The Results of the Wilcoxon Signed Ranks Test performed according to the Pretest-Posttest Scores of the Performance-Psychomotor Field Rating Scale of the Experimental Group

Control Group Pretest-Posttest	N	Rank Average	Total Ranking	Z	P
Negative Rank	6	5.83	35.00		
Positive Rank	4	5.00	20.00	-.764	.445
Equivalent	0	-	-		

According to Table 7, there is no significant difference between the pretest and posttest scores of the Performance-Psychomotor Field Rating Scale of the control group (p>.05). Considering the rank averages, a slight difference is observed at the rate of 0.83. This reveals that violin education lessons conducted with the traditional methods did not have sufficient effect on developing the psychomotor skills of the students.

Table 8. The Results of the Mann Whitney U Test performed According to the Posttest Scores of the Performance-Psychomotor Field Rating Scale of the Groups

Group	n	Rank Average	Total Ranking	Mann Whitney U	Z	P
Experimental	10	13.30	133.00	22,00	-2.117	.034
Control	10	7.70	77.00			

According to Table 8, there is a significant difference between the Performance-Psychomotor Field Rating Scale posttest scores of the groups (p>.05). This result shows that violin education lessons conducted with the mind mapping technique were more effective on increasing the psychomotor skills of the students, compared to the traditional violin education practices.

Results on the Performance-Cognitive Field Rating Scale

Table 9. The Results of the Mann Whitney U Test performed According to the Pretest Scores of the Performance-Cognitive Field Rating Scale of the Groups

Group	n	Rank Average	Total Ranking	Mann Whitney U	Z	P
Experimental	10	9.95	99.50	44.50	-.416	.677
Control	10	11.05	110.50			

Table 9 shows that there is no significant difference between the Performance-Cognitive Field Rating Scale pretest scores of the experimental and control groups (p<.05). According to this result, it was determined that the knowledge of the experimental and control groups about the musical piece they played, in terms of the genre and style fields, was similar.

Table 10. The Results of the Wilcoxon Signed Ranks Test performed according to the Pretest-Posttest Scores of the Performance-Cognitive Field Rating Scale of the Experimental Group

Experimental Group Pretest-Posttest	N	Rank Average	Total Ranking	Z	P
Negative Rank	1	4.00	4.00		
Positive Rank	9	5.67	51.00	-2.397	.017
Equivalent	0	-	-		

Table 10 shows that there is a significant difference between the Performance-Cognitive Field Rating Scale pretest-posttest scores of the experimental group (p<.05). This result reveals that the mind mapping technique contributed to the experimental group to gaining cognitive skills towards the genre and style fields.

Table 11. The Results of the Wilcoxon Signed Ranks Test performed according to the Pretest-Posttest Scores of the Performance-Cognitive Field Rating Scale of the Control Group

Control Group Pretest-Posttest	N	Rank Average	Total Ranking	Z	P
Negative Rank	3	6.50	19.50		
Positive Rank	6	4.25	25.50	-.356	.722
Equivalent	1	-	-		

As can be seen in Table 11, there is no significant difference between the pretest and posttest scores of the Performance-Cognitive Field Rating Scale of the control group (p>.05). This result reveals that violin education lessons conducted with the traditional methods did not contribute to the control group to having sufficient knowledge about the genre and style field in the musical pieces studied.

Table 12. The Results of the Mann Whitney U Test performed According to the Posttest Scores of the Performance-Cognitive Field Rating Scale of the Groups

Group	n	Rank Average	Total Ranking	Mann Whitney U	Z	P
Experimental	10	13.15	131.50	23.50	-2.009	.043
Control	10	7.85	78.50			

According to Table 12, there is a significant difference between the Performance-Cognitive Field Rating Scale posttest scores of the experimental and control groups (p>.05). This result reveals that violin education lessons conducted with the mind mapping technique contributed further to the students to having knowledge about the musical pieces they studied on the genre and style field, compared to the violin education lessons conducted with the traditional methodştur.

Results on the Violin Lesson Student Observation Form

Table 13. The Results of the Wilcoxon Signed Ranks Test performed according to the Violin Lesson Student Observation Form Scores of Weeks 1 and 6

Experimental Group Pretest-Posttest	N	Rank Average	Total Ranking	Z	P
Negative Rank	0	.00	.00		
Positive Rank	24	12.50	300.00	-4.288	.000
Equivalent	0	-	-		

According to Table 13, there is a statistically significant difference between the week 1 and week 6 scores of the observation form for the experimental group in the violin education lessons conducted with the mind mapping technique (p<.05). This result shows that the mind mapping technique was effective for gaining the targeted behaviors in violin education lessons.

Results on the Posttest and Retention Test Scores of the Test of Cognitive Field Evaluation

Table 14. Results of the Wilcoxon Signed Ranks Test performed according to the Posttest / Retention Test Scores of the Test of Cognitive Field Evaluation of the Experimental Group

Experimental Group Posttest / Retention Test	N	Rank Average	Total Ranking	Z	P
Negative Rank	5	4.40	22.00		
Positive Rank	2	3.00	6.00	-1.403	.161
Equivalent	3	-	-		

According to Table 14, there is no significant difference between the posttest and retention test scores of the Test of Cognitive Field Evaluation of the experimental group (p<.05). This result reveals that there was a similarity between the posttest scores and the retention test scores achieved by the experimental group, and thus retention of the knowledge learned was ensured. These findings determines that the mind mapping technique used in violin education lessons contributed to recalling the knowledge learned in violin lesson positively.

Table 15. Results of the Wilcoxon Signed Ranks Test performed according to the Posttest / Retention Test Scores of the Test of Cognitive Field Evaluation of the Control Group

Experimental Group Posttest / Retention Test	N	Rank Average	Total Ranking	Z	P
Negative Rank	8	5.00	40.00		
Positive Rank	1	5.00	5.00	-2.088	.037
Equivalent	1	-	-		

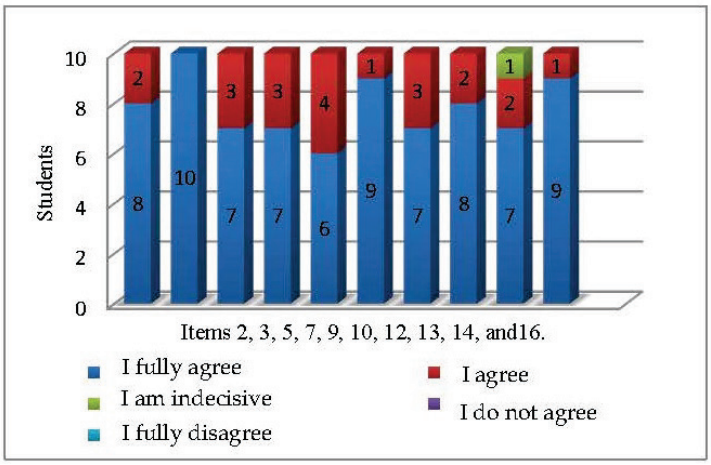
According to Table 15, there is a significant difference between the posttest and retention test scores of the Test of Cognitive Field Evaluation scores of the control group ($p<.05$). This result reveals that there was a difference between the posttest scores and the retention test scores achieved by the control group. This means that the knowledge learned was not retentive. These findings determines that violin education lessons conducted with the traditional methods did not sufficiently contribute to recalling the knowledge learned in violin lesson.

Table 16. The Results of the Mann Whitney U Test performed According to the Retention Test Scores of the Test of Cognitive Field Evaluation of the Groups

Group	n	Rank Average	Total Ranking	Mann Whitney U	Z	P
Experimental	10	13.65	136,50	18.50	-2.387	.017
Control	10	7.35	73.50			

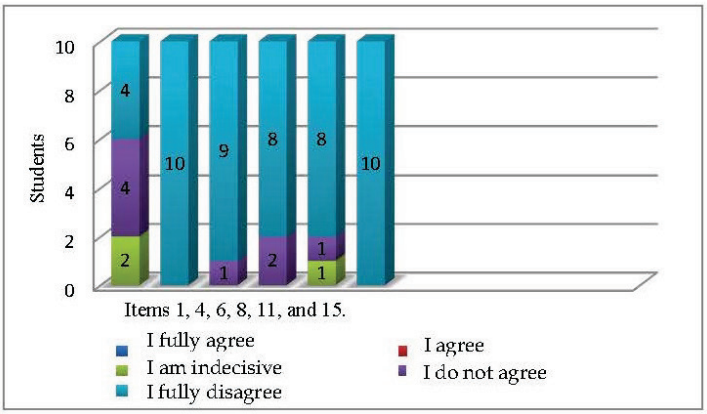
According to Table 15, there is a significant difference between the retention test scores of the Test of Cognitive Field Evaluation scores of the experimental and control groups ($p<.05$). This result shows that violin education lessons conducted with the mind mapping technique in the experimental group were more effective on recalling the knowledge learned by the students, compared to the lessons conducted with the traditional methods.

Results on the Attitude Scale towards the Mind Mapping Technique Used in Violin Lessons



Graphic 1. Opinions of the Students on the Positive Items in the Attitude Scale towards Mind Mapping Technique Used in Violin Lessons

It is clear from Graphic 8 that "I fully agree" option for the positive items in the attitude scale was the most preferred option, and the second most preferred option was "I agree". The graphic shows that "I do not agree" and "I fully disagree" options in the attitude scale were not chosen by any student. It is also observed that one student chose "I am indecisive" option for only item 14 among the items constituting the positive attitude sentences of the scale.



Graphic 2. Opinions of the Students on the Negative Items in the Attitude Scale towards Mind Mapping Technique Used in Violin Lessons

According to Graphic 2, nearly all of the students chose "I fully disagree" option for the negative attitude sentences in the attitude scale. The second option chosen the most after this option was "I do not agree". These findings reveal that the majority of the students disagreed with the negative attitude sentences in the scale. As can be seen in the graphic, "I am indecisive" option for the negative items in the scale was chosen by 3 students total.

Discussion, Conclusion and Suggestions

In this research, the changes in the cognitive and psychomotor skills of the students as a result of using the mind mapping technique in the violin education lessons were studied. During the individually conducted violin education lessons, it was enabled to achieve a process of education in line with the needs of the students, thanks to the mind maps created individually. Thus, a student-oriented education was achieved, supporting the instrument education lessons where it was considered necessary to take into consideration the individual differences.

Bastem (2012), Bütüner (2006), Çamlı (2009), Kan (2012), Kıdık Elgin (2005), Yetkiner (2011), and Yılmaz (2012) determined the effectiveness of the mind mapping technique in increasing the academic achievements of the students, compared to the traditional education, as a result of their researches in different fields of education. According to the results of this research, the mind mapping technique was also more effective in increasing the achievement in violin education lessons, compared to the traditional teaching methods. The increase in the cognitive skill achievements of the students towards their fields can be explained by the fact that they learned certain terms and concepts of the field of music and the pieces they study more meaningfully thanks to the mind maps. Thus, the consideration that mind maps are effective in learning a concept gains strength. This consideration supports the results obtained by Abi-El-Mona and Abd-El-Khalick (2008), Budd (2004), Farrand et al. (2002), and Yaşar (2006) in their studies.

Jordan-Miller (2010) designed a cognitive skill curriculum that involves a 12-week education process in order to develop the performance skills of pianists, basing on the fact that an increase in the cognitive skills would contribute to the performance skills. The third week of this curriculum has some cognitive maps that involve summarization of the important factors constituting the structure of the musical piece with symbols or textual clues developed by pianists. Kurtuldu (2007) aimed to develop the piano playing skills of the students by creating cognitive schemes by means of cognitive images in his study, in which he researched the usability level of the visual images method in piano education. He revealed as a result of his study that the method of creating visual images is more effective and useful, compared to the classical methods of study in piano education. In parallel with the purposes and results of these studies, it was concluded that instrument education provided with the mind mapping technique ensures significant learning by creating cognitive schemes in students' memories, developing the cognitive and psychomotor skills. Briefly, the violin education lessons conducted with

the mind mapping technique were effective in developing the instrument playing skills of the students. This result shows that the cognitive development levels of the students in the field of music reflect in their instrument playing behaviors as well.

Repetitions have an important place in learning (Bilge, 2011, p. 288). It was observed as a result of the research that taking notes of the basic concepts and terms related to the musical pieces studied with the experimental group on the mind map in each lesson and adding new concepts and terms, then reviewing them were effective in achieving retention. Different mind maps were created during the class activities performed with the experimental groups within the scope of the gains of the violin lesson and the musical piece studied, and finally the mind maps created in each lesson were combined into a sing resulted in effective facts in eliminating the misconception of the students and in observing the inter-concepts relations.

The research by Bennett (1984) revealed that detailed learning achievements of students increase by means of the mind mapping technique. According to the results of this current study, the violin education lessons conducted with the mind mapping technique enabled the students to perceive the music integrally and to learn the fundamental structures of music in detail. The fact that mind maps were individual ensured that different cognitive or psychomotor skill needs of the student were presented and noted; and the fact that the mind maps involved different structures special to each student was effective on the learned knowledge to be retentive.

According to the item-score averages of the attitude scale towards determining the attitudes of the experimental group students towards the mind mapping technique used in the violin lessons, it was concluded that the attitudes of the students towards the use of the mind mapping technique in the violin education lessons were positive in general. This result is similar to the conclusion reached by Aydın (2009), Bütüner (2006), and Treviño (2005) in their researches that the subjects had a positive attitude towards the mind mapping technique. Several students responded to some of the attitude sentences in the attitude scale as "I am indecisive"; and two students stated that they were indecisive for the sentence "creating mind maps takes plenty of time". These results can be attributed to the fact that the students had never experienced any education process other than a violin education process they were already familiar with and that a study involving research and not taking was conducted. Nevertheless, it was observed that one student was indecisive about the attitude sentence of "I am not interested with the mind maps used in violin lessons" and one student was indecisive about the attitude sentence of "I like using my imagination while preparing a mind map". This can be expressed by the fact that the students just newly learned this technique and that they were accustomed to be provided with convenience information in their learning environment, instead of a process based on research.

The study by Bütüner (2006, p. 90) shows that the lowest score average among the item-score averages of the attitude scale towards the mind mapping technique was the item "creating mind maps takes plenty of time" in the study. The findings on the fact that creating mind maps takes plenty of time were suggested in several researches. For example, in the research by Pollard (2010), it was determined that although the students considered mind map as a useful education instrument, they thought that it takes too much time. Besides, Şeyihoğlu and Kartal (2010) stated as a result of their study that the mind mapping technique has a disadvantageous aspect due to the problems of time limitations, while it ensures retention increasing the achievement. According to these findings, the consideration arose that there can be some problems of timing while creating mind maps. Thus, time planning must be addressed carefully while conducting the studies on teaching of the mind mapping technique.

The studies by Ördekçi (2016) and Yiğit (2017) in the field of music education can be viewed to provide support for the findings of this study. Ördekçi (2016) developed various visual materials to utilize for teaching basic music concepts, in line with the primary school 4th grade music lesson in her research. The materials prepared were evaluated upon being submitted to five music teachers and five form teachers for their opinions. As a result of the evaluations, it was concluded that the visual materials prepared to be utilized in music education for primary school 4th grade students are capable of arousing

the interest of the students, would be effective to render the subjects comprehensible and make learning permanent, are easy to prepare for music and form teachers, and can be used in music lessons. Yiğit (2017) studied with 48 students in total, consisting of experiment (N=25) and control (N=23) groups of primary school 4th grade students, in her PhD study where she researched the effectiveness of song maps created to be used for teaching school songs. Six songs chosen within the Curriculum of Music Lesson for Primary School 4th Grade were mapped and used by the researcher for teaching the school songs for 6 weeks. As a result of the study, it was observed that the success of the students in the experiment group in learning songs was higher compared to the students in the control group, also song maps increased memorability and had a positive effect on the students.

Some recommendations were brought forward to increase the usability of the mind mapping technique in the field of musical education, and accordingly to enable the practices to be effective, serving as a source for the researches, due to the limited literature in this field:

- Researches on determining the effectiveness of the mind mapping technique, the effect of which on the process of violin education was researched, addressing it in different musical instrument education processes or in the other fields of music education.
- The mind mapping technique can be included in the music education and musical instrument teaching programs as a teaching material.
- Teachers should be informed of the mind mapping technique and encouraged to use this technique in the fields of music education.
- The mind mapping technique can be included in the program contents of the lessons instructed at the music education departments of the universities. The music educator candidates can be provided information about this technique, in addition to the teaching methods, techniques, and materials they currently learn.
- Sample mind maps involving the lectures to be used as the lessons such as theory of music and history of music.
- Studies can be conducted for preschool music education on the use of the mind mapping technique to develop the music listening skills of the students.
- In this research, individual mind maps were studied with. Different studies can be conducted with group mind maps in music teaching practices.
- This research enrolled a group of students between the ages of 14 and 16. The mind mapping technique can be applied in different age groups and findings on the age variable can be addressed comparatively.
- In this research, hand-drawn mind maps were studied with. Different studies in the field of music education can be performed with computer-aided mind maps to be created using software of mind mapping techniques.

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Appendix 1. The Learning Outcomes Table

	1. PIECE	2. PIECE
TEMPO & RHYTHM	Andante Allegro Triplet Auftakt C (4/4) Sebare	Tempo I Allegro moderato Metronome number 4 bar rest Rit. A tempo Puandorg Ritardando 6/8 Syncopation
ARTICULATION	Upbow, downbow Legato Detache Portato Martele Marcato Staccato Tie Trill	Upbow, downbow Accent Legato Detache Staccato Fr.
MUSICAL FORMS & STYLES	Baroque Telemann G Major Modülation D Major Alteration	Huber Op.8, No.4 Concerto G Major B flat Major G minor
DYNAMICS	pp, p, mf cresc., decresc.	p, mf, f, cresc., decresc.
EXPRESSION TERMS	Espressivo Dolce	Espressivo Grazioso Meno mosso Tenuto Largamente Scherzando
OTHER	Reprise Duate Simile	Reprise Duate Opus

Appendix 2. Test of Cognitive Field Evaluation Sample Questions

QUESTIONS

1. Which of the followings indicates moderate speed tempo?

   A. Allegro agitato
   B. Allegro moderato
   C. Allegro maestoso
   D. Allegro molto

2. Fermata or in other words …… is a pause of unspecified length on a note or rest.

   A. Puandorg
   B. Fermamente
   C. Cadanze
   D. Slur

3. Which one is the meaning of the term "simile"

   A. Playing softly
   B. Playing in a similar way
   C. Playing freely
   D. Repeat

4. The German word "Auftakt" is the mean of …….

   A. Beginning of the measure
   B. Bar line
   C. Upbeat
   D. End of the measure

5. Which one is the meaning of the term "grazioso"

   A. Softly
   B. With in a smooth and elegance
   C. Like a sing a song
   D. Sharply

Appendix 3. Performance Rating Scale

Violin Lesson
Performance-Psychomotor Field Rating Scale

Date : ……..

Student:……. **Observer: ……..**

LEARNING OUTCOMES		1 (0-19)	2 (20-39)	3 (40-59)	4 (60-79)	5 (80-100)
Posture & Grip	Standing in a balanced position					
	To place the violin in shoulder and chin correctly					
	Holding the left hand in the right position and right situation					
	To place the right hand on the bow correctly					
	To spread bow correctly					
Tempo & Rhythm	To play the piece in the correct tempo					
	To maintain the piece tempo					
	To play rhythm patterns correctly					
	To be able to apply tempo changes in the piece					
Entonation	To play notes correctly and clearly					
Phrasing & Articulation	To be able to apply application of upbow and downbow movements correctly					
	To be able to perform the bow technique					
	Playing the piece with the right finger numbers					
	Playing the piece with the correct phrasing					
	To play the piece according to the musical period					
	Ensuring the right and left hand coordination when playing					
Dinamics	To play according to the nuance signs and terms in the piece					
Expression Terms	To play according to the expression terms in the piece					

Performance-Cognitive Field Rating Scale

LEARNING OUTCOMES	1 (0-19)	2 (20-39)	3 (40-59)	4 (60-79)	5 (80-100)
To be knowledge about the period of the piece					
To be knowledge about the composer of the piece					
To be knowledge about the tonality of the piece					
To notice the tempo changes in the piece					
To be knowledge about the style of the piece					

Appendix 4. Violin Lesson Student Observation Form

Date:……...

Student:…… **Observation Week:……**

LEARNING OUTCOMES		0-19	20-39	40-59	60-79	80-100
Posture & Grip	Standing in a balanced position					
	To place the violin in shoulder and chin correctly					
	Holding the left hand in the right position and right situation					
	To place the right hand on the bow correctly					
	To spread bow correctly					
Tempo & Rhythm	To play the piece in the correct tempo					
	To maintain the piece tempo					
	To play rhythm patterns correctly					
	To be able to apply tempo changes in the piece					
Entonation	To play notes correctly and clearly					
Phrasing & Articulation	To be able to apply application of upbow and downbow movements correctly					
	To be able to perform the bow technique					
	Playing the piece with the right finger numbers					
	Playing the piece with the correct phrasing					
	Ensuring the right and left hand coordination when playing					
Dinamics	To notice the nuance signs and terms in the piece					
	To play according to the nuance signs and terms in the piece					
Expression Terms	To notice the expression terms in the piece					
	To play according to the expression terms in the piece					
Musical Forms & Styles	To be knowledge about the period of the piece					
	To be knowledge about the composer of the piece					
	To be knowledge about the tonality of the piece					
	To notice the tempo changes in the piece					
	To be knowledge about the style of the piece					

Appendix 5. Attitude Scale Towards the Mind Mapping Technique Using in Violin Lessons

Student: . . . . . .

ATTITUDE SENTENCES	I fully agree	I agree	I am indecisive	I fully disagree	I do not agree
1. Creating mind maps takes plenty of time					
2. Thanks to the mind maps, I see the subject holistically					
3. Thanks to the mind map I understand the basic concepts of the subject					
4. The mind map is not an effective tool to remember information					
5. I would like to use the mind map technique in other lessons					
6. It is not necessary to use the mind map technique in violin lessons					
7. I use my working time more efficiently with mind maps					
8. The Mind map is not an effective tool when preparing for exams					
9. My interest in violin lessons is improved through mind maps					
10. Thanks to the mind maps, I can see my lack of the subject in violin lessons					
11. I'm not interested with the mind maps used in violin lessons					
12. The subject becomes regular and clear by using mind map					
13. My learning is facilitated by visualization of the subject					
14. I like using my imagination while preparing a mind map					
15. Mind mapping technique is not an effective learning tool for violin lessons					
16. Mind maps help me prepare for the exams					

Appendix 6. Photographs of Violin Training with Mind Map Technique