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Görme Engelli Öğrencilerin Sanatı Öğrenmesinde Müzelerin Katkısı*

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ÖZET

Araştırmanın amacı, müzede gerçekleştirilen eğitim etkinliklerinin görme engelli öğrencilerin sanat bilgisine ve sanatsal uygulamalarına katkısını incelemek, müze ziyaretine ve müzede eğitim sürecine ilişkin görme engelli öğrencilerin ve görsel sanatlar öğretmeninin görüşlerini belirlemektir. Araştırma, kör tanısı konmuş toplam 10 öğrenci ve bu öğrencilerin görsel sanatlar öğretmeni ile yürütülmüştür. Araştırmada, karma yöntem kullanılmıştır. Araştırma verileri başarı testi, doküman analizi ve yapılandırılmış görüşme formu ile elde edilmiştir. Araştırma bulguları, müzede eğitim etkinlikleri uygulanan görme engelli öğrencilerin ön test ve son test başarı testi puanları arasında anlamlı bir farklılık olduğunu ortaya koymuştur. Müzede eğitim etkinlikleri öncesi ve sonrası görme engelli öğrencilerin yapmış oldukları sanatsal ürünün sanatçı eserine bağlı kalma durumu, kompozisyon ve yorum ölçütleri bakımından da puanlamaları arasında anlamlı bir fark bulunmuştur. Bu araştırma, müzeye ve eğitim faaliyetlerine erişimde zorluk yaşayan görme engelli öğrencilere özel erişim hizmetleri sağlandığında müzelerin bu öğrenciler için bir öğrenme ortamı haline geldiğini ve daha verimli müze ziyaretleri yapılabileceğini göstermektedir.

Anahtar Sözcükler: Müze, müzede eğitim etkinlikleri, müze ziyareti, görme engelli öğrenciler, görsel sanatlar eğitimi.

The Contribution Of Museums To Arts Learning Of Students With Visual Impaired

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ABSTRACT

The focus of this study was to investigate the contribution of the educational activities conducted in museums to the art knowledge and artistic practices of visually impaired students, and to determine the views of students and visual arts teachers about the visits to the museum and the educational processes conducted in museums. The study was conducted with 10 students diagnosed with blindness and visual arts teachers of these students. The mixed method, was used in the study. Research data were collected with achievement tests, document analysis and a structured interview form. The study findings revealed a significant difference between pre-test and post-test achievement test scores of visually impaired students who participated in the educational activities conducted in the museum. A significant difference was determined between the scores of visually impaired students before and after the educational activities in the museum based on adherence of student works to the original work, their composition and interpretation. This research shows that when special access services are provided for visually impaired students who have difficulties in accessing the museum and its educational activities, museums become a learning environment for these students and can make more efficient museum visits.

Keywords: Museum, educational activities in museums, museum visit, students with visual impaired, fine arts education.

**The present study was based on the dissertation presented to GU Institute of Educational Sciences (Advisor: Prof. Dr. Serap BUYURGAN) and titled "The contribution of museums in art education of visually impaired students".*

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1. INTRODUCTION

In changing and developing societies, museums are no longer indoor spaces where objects are preserved and stored, but spaces that individuals of all ages could visit, socialize, and learn. Museums could be described as sustainable and not-for-profit institutions that collect, preserve and exhibit all artistic, archeological, cultural, scientific products that are of interest to the people, act as a bridge between the past and the future, offer educational, informational and research opportunities, and facilitate the pleasure, learning and creativity of the individuals (Buyurgan & Mercin, 2005). The museum is an exciting learning space for the public that holds the artistic, scientific, traditional, historical, technological and natural traces of the past, present and the future where learning by seeing, hearing, practicing, even living is possible (Buyurgan & Buyurgan, 2018, p.68).

Museums have social, cultural and educational functions. According to Karadeniz and Çıldır (2014), museums can play a key role in inspiring people, improving their quality of life, identity, and social solidarity. Furthermore, they are important learning centers that provide opportunities for socially disadvantaged individuals through special programs. In particular, analysis of their educational functions would demonstrate that museums are no longer limited to books or schools, which are the classical learning methods, but considered as spaces where psychomotor, affective and cognitive skills of the individuals could be improved (Buyurgan & Mercin 2005). It was observed that the presence of actual objects in museums provides effective and more permanent learning and allows the individuals to establish connections between the objects and events. The positive aspect of the employment of concrete objects in instruction is the availability of the same object for more than one knowledge level. For example, the same piece of art could be used for advanced and beginning students. While the objects allow the transition between the topics, they also activate certain skills such as questioning, narrating, close observation, discussion, comparison, documentation, etc. Thus, students could establish a connection between their prior and recent knowledge (Onur, 2012).

Currently, museums are considered as informal education spaces that allow learning by doing and living. Thus, the activities and programs conducted in museums have been used effectively in the education of children and young adults. Skills such as perception, comparison, discussion, criticism, etc. that museums could contribute to the education from childhood to adolescence. It should be considered that museums would develop skills and should be a part of school curricula. Since there are problems in the implementation of museum activities, it could be suggested that museum activities have been insufficient for children with special education needs. Museums and galleries often present insurmountable problems for people with disabilities. It was observed that museums could be inaccessible for these individuals due to parking problems, first access, staff untrained to assist these individuals, poor lighting, and even exhibitions at upper floors (Thorpe, 1987, p. 7-13; cited in DES, Hooper-Greenhill, 1991/1999). In global and Turkish museums, regular educational activities and access facilities for individuals with various disabilities are far from satisfactory except a few temporary projects

and limited facilities for especially individuals with visual impaired such as tactile areas and walking aids.

The study was conducted with visually impaired children who need special education. Visual impairment is described as complete or partially inadequate vision that negatively affects the social adaptation and educational performance of the individual (Doğru, 2013). Cavkaytar and Diken (2006) reported that there was no difference between the academic achievements of individuals with full vision and visual impairments when academic achievements were tested with various methods. It was argued that low academic achievement was not due to the visual impairment but unavailability of instructional material suitable for visually impaired students. Various materials such as the Braille alphabet, glasses, auditory tools, dioramas, models, relief maps and paintings, hand magnifiers, audiobooks, overhead projectors, abacuses, large printed books could contribute to learning by organizing educational environments that would support their visual experiences. Thus, instructional methods developed particularly for children with visual impaired should be used in the classroom, at home and even in museums based on the applications that would improve the visual experiences of these children. According to Doğru (2013), the conceptual development of visually impaired children is lower than the children with typical development. Their achievements in abstract concepts is low because they could not have adequate learning experiences. Instead of learning by seeing, they could learn by touching and hearing. The child should be allowed to recognize the objects by touching, and the features of the objects that they cannot touch should be described to them. Auditory and tactile materials, colorful attention-grabbing objects and pictures, texts in large font and the Braille alphabet should be employed in their education. Furthermore, the hand-eye coordination in infants with typical vision is replaced by ear-hand coordination in infants with visual impairment. Activities to improve hand-eye coordination should be adopted for children with low vision. Ear-hand coordination should be developed in blind children (Baykoç Dönmez, Sümer, & Uyaroğlu et al., 2011, p. 229). It is known that visual arts and modeling courses in the education of visually impaired children has positive effects on hand, eye and ear-hand coordination, development of fine motor skills, and social relations. Since individuals who were born blind or lost their vision at an early age experience difficulties in perceiving forms and relationships and understanding the relationship and integrity between the parts of a whole, modeling should be employed to allow the blind individuals to perceive the most realistic designs in their environment to overcome these restrictions (Enç, 2005). Another problem that visually impaired children experience in learning is the difficulty of perceiving abstract concepts. Baykoç Dönmez et al. (2011) emphasized that concrete examples could be used in teaching these concepts, and objects that could not be touched could be instructed by the examination of models. Learning of visually impaired children could be facilitated with the use of the sense of smell, taste, touch, hearing, and employment of concepts and objects. A visually impaired child does not have the ability to create a visual image of an object. Like a child with typical vision, a visually impaired child may remember what a table looks like, but the latter employs a haptic image. The image of a table for a visually impaired child is based on a combination of feeling and touching senses and body movements (Özyürek, 1995). For the visually impaired children to produce creative ideas using their imagination and produce creative works in visual arts and modeling courses, their knowledge and imagination should be improved through all other senses.

It is clear that today, as we consider museums as important learning areas, children who require special education should also benefit from these learning spaces. One of the positive features of museums that facilitate learning is the fact that they allow the perception of real or copied objects through the senses. According to Hooper-Greenhill (1991/1999), touching something that is not used frequently in daily life, or an object produced by someone else is an extraordinary experience. Using other senses, when possible, to perceive the object expands and deepens both the knowledge and experience with the object. Considering the learning difficulties that children who receive special education experience, effective learning activities could be conducted in museums using tactile, auditory, visual, taste and olfactory senses when necessary. Thus, private educational institutions and administrators should support learning in museums and develop adequate programs and reflect the significance of the employment of museums as an educational tool for children with any disability to learn and socialize.

The lack of an educational department in several Turkish museums, and unavailability of educational activities for all audiences in those that provide educational activities suggest that schools, teachers and families could not use museums as learning environments efficiently. Thus, a planned museum visit was conducted to Gazi University Painting-Sculpture Museum with visually impaired students that require special education to determine the contribution of museums to arts learning of visually impaired students. It was considered that the present study would serve as a guide for the use of museums in the education of visually impaired children, to determine the activities that museum educational department could organize for visually impaired children, and availability of the access facilities for these children. In the study, a museum guide was developed in Braille alphabet for visually impaired students to also guide the teachers and experts in museum educational departments. In the study, based on the problems experienced by visually impaired students in learning, materials that would allow them to concretize abstract concepts (i.e., models, relief paintings, actual objects, verbal presentations that described the museum and artifacts, a relief table covered with different fabrics for color knowledge), museum presentation (social narrative), artifact tags, specially designed activities for olfactory, tactile and auditory senses were developed.

1.1. Purpose of the Study

The focus of this study was to investigate the contribution of the educational activities conducted in museums to the art knowledge and artistic practices of visually impaired students, and to determine the views of students and visual arts teachers about the visits to the museum and the educational processes conducted in museums.

1.2. Research Questions

1. Is there a significant difference between the pre-test and post-test achievement test scores of visually impaired students who participated in museum education?
2. Is there a significant difference between the pre-test and post-test artistic application scores of visually impaired students who participated in museum education?
3. What are the views of the visually impaired students on the museum visit and education process in the museum?
4. What are the views of the visual arts teacher on the museum visit and education process in the museum?

2. METHODOLOGY

The mixed method, where both quantitative and qualitative methods are employed, was used in the study. Johnson and Onwuegbuzie (2004) defined mixed research as a method that combines or blends quantitative and qualitative research techniques, methods, approaches, concepts or language in a study. Convergent parallel mixed method design was used in the study. This design entails collection and analysis quantitative and qualitative data in two distinct processes but in a single step, combining the results, and the analysis of the differences, similarities, contradictions or correlations between the two datasets (Creswell & Clark 2011/2014). According to Teddlie and Tashakkori (1998), quantitative and qualitative data are collected concurrently and analyzed in a complementary manner in this design. The interaction levels of quantitative and qualitative stages are independent. Research questions, data collection and data analysis are conducted separately, and the results are presented with a comprehensive interpretation at the end of the study. In the study, quantitative and qualitative data were collected simultaneously. "Weak experimental design" was used to collect quantitative data and "case study design" was employed to collect qualitative data. Since the study was conducted with visually impaired individuals, it was not possible to reach adequate number of subjects in the same age and with similar disability levels to assign to a control group, and to determine the group members randomly. Thus, the single group pre-test-post-test design was employed. The aim of the researcher in qualitative research is to observe environmental characteristics from a 'holistic' (systematic, inclusive and integrated) perspective (Miles & Huberman 1984/2016). The holistic single case design, one of the case study designs, was employed in the study. According to Yıldırım and Şimşek (2008), there is only one unit of analysis (a program, an institution, an individual, a school, etc.) in single case design research. The holistic single case design could be employed to study outliers, specific, extreme cases outside of the general standards.

2.1. Participants

In the quantitative dimension of the study, purposive sampling method, a non-random sampling method, was employed. In purposive sampling, the author determines the subjects assigned to the sample based on experience, knowledge and observations, and the aim of the study. The author should have knowledge on the population since sampling is determined by the author's judgment and assessment (Ural & Kılıç, 2011). Purposive sampling could be used when the sample should be determined to understand, explore, gain insight and learn several things (Merriam 2009/2013). This method, according to Patton (1980/2014), entails selection of information-rich situations to conduct more in-depth research. It allows studying and comprehension of information-rich cases in depth instead of empirical generalizations (p. 230). The participants were assigned by purposive sampling method since there were only two schools for the visually impaired in Ankara and there were not sufficient number of blind 8th grade students in these schools. In the qualitative dimension of the study, the participants were assigned with "typical case sampling", a purposive sampling method, to determine the contribution of museums during arts learning of visually impaired students and the views of

visual arts teachers on this application and the visit to the museum. In this sampling method, when the researcher desires to introduce an innovation or a new application, he / she could work by determining one or a few of the most typical cases among a series of cases where this application or an innovation is conducted (Yıldırım & Şimşek, 2008).

Since the study did not aim to generalize the findings to the population, 10 students with different degrees of visual impairment and diagnosed as blind by the Counseling Research Center were included in the study. Mitat Enç Secondary School for Visually Impaired located in Ankara was selected as the study area. The quantitative study data were collected from all 8th grade students who attended the school during the 2017-2018 academic year spring semester. Although the total class size in two branches was 13 students, during the application, one student moved to another city, another student was absent during the museum visit, and another student was excluded since the student was diagnosed with only low vision. The students were in the 13-15 age group. Quantitative data were collected from 5 female and 5 male, a total of 10 visually impaired students. The qualitative study data were collected from the 10 students from whom the quantitative data were collected and their visual arts teacher (n = 11). The informed consent form was obtained from the parents of the day students and the school administration for the boarding students, and the visual arts teacher. Three students were boarding students. In Table 1, the gender and the degree of visual impairment of the participants are presented in detail.

Table 1. *The Gender and the Degree of Visual Impairment of the Students with Visual Impaired*

Student Code	Gender	Degree of İmpairment
S1	Female	90% of Total
S2	Male	85 % of Total
S3	Female	85 % of Total
S4	Male	100% of Total
S5	Female	85% of Total
S6	Male	85% of Total
S7	Male	64% of Total
S8	Female	85% of Total
S9	Male	100% of Total
S10	Female	90% of Total

2.2. Data Collection Instruments

The study data were collected with the achievement test, document analysis and structured interviews.

2.2.1. Achievement test

The achievement test was developed after the aim of the test, the table of specifications and targets were determined, and the number of questions and question types, test duration and test items were selected, and the test was finalized. The classification developed by Bloom et al. was adopted for the achievement test. Cognitive processes dimension of Bloom's taxonomy was classified as recall, comprehension, application, analysis, evaluation and creation (Turgut & Baykul, 2013). The draft test included 29 items based on the acquisitions described in the Visual Arts Course Curriculum and it was decided to include 24 test items in the achievement test after the required editing based on expert feedback. The test

included multiple choice questions with four options. The achievement test included 15 items on design elements and principles, and 9 on impressionism and abstract art movements. The questions were distributed throughout the test based on the test development principles. The duration of the test was determined as 40 minutes based on expert recommendations and the special conditions of the participants. The achievement test was applied to the students as pre-test and post-test before and after the museum visit. Since the study did not include an adequate number of blind students, a pilot scheme was not conducted. The validity and reliability of the achievement test developed by the advisor and the author was conducted based on expert opinion.

2.2.2. Document analysis

In the study, a relief study was conducted to determine the development in students' artistic works before and after their visit to the museum. Relief is the elevation formed by carving into a straight surface and the indented and protruding structures formed by this elevation (Berber & Başaran, 2018). To allow the visually impaired students to concretize the abstract concepts by touching them during the artistic applications, chamotte clay was used as the material and they were asked to create their own works based on one of the works produced by the artists Halil Pasha and Cemal Bingöl.

2.2.3. Structured interviews

The qualitative study data were collected with the structured interview technique. Interviews are the most common data collection method in qualitative research (King, 2004). Patton (1980/2014) discussed the interview approach in three categories: casual conversational interviews, the interview manual approach, and standardized open-ended interviews. The standardized open-ended interview requires precise formulation of all questions before the interview. It ensures that each participant is asked the same questions in the same order, including the probe questions. This approach reduces interviewer bias or subjectivity, which may lead to the collection of more information from certain participants and superficial and systematic information from others (Yıldırım & Şimşek, 2008). To determine in-depth views of the students and teachers about the museum visit and the educational activities conducted in the museum, all participating students and the visual arts teacher were interviewed. Expert opinions were obtained to ensure the validity and reliability of the interview questions. The interviews were recorded after the consent of the participants was obtained.

2.3. Data Collection Process

Before and during the museum visit, models, relief paintings, real objects, verbal descriptive presentations that described the museum and the artifacts, relief painting covered with different fabrics to provide color information, museum introduction (social narrative) presentation, museum guide in Braille alphabet, artifact tags activities that entailed olfactory, tactile and auditory senses, and supplementary material were utilized. One of the techniques employed in the museum visit was models. Models are used in static exhibitions to enforce the expression. Modeling entails the copying the buildings, settlements and vehicles in reduced dimensions (Erbay, 1998). Furthermore, materials such as clay and dough can help raising proportion, relationship and integrity awareness in visually impaired individuals by reducing the size of the objects (Özgür, 2013). During the museum visit, Halil Pasha's painting titled Alemdağ was modeled by the author and visually impaired students used their tactile sense to perceive the

panting. A model of the second work, Cemal Bingöl's painting titled "Composition" was duplicated in the relief form by the author using fabrics. Since the painting included geometric shapes and vibrant colors, visually impaired students could identify the two-dimensional painting in three dimensions by touching it. Learning colors is very important for blind individuals. But it is also difficult since the colors do not mean anything mentally for them. Thus, it was necessary to explain colors by associating them with other sensory properties (Baykoç Dönmez et al., 2011). Using different fabric types and textures in the relief painting that was covered with fabric, the visually impaired students could perceive the colors. The color yellow in the painting was represented by a thick fleece fabric, the color green was represented by a piece of solid leather, white was represented by a linen fabric, and a black was represented by a satin fabric. Furthermore, to create mental meaning, the geometric shapes and forms on the painting were reflected by wooden toys and pieces cut from chipboard to allow the students to touch them. Also, relief paintings of both works were developed with the copper relief technique. Touching objects in museums allows visitors to acquire a first-hand experience with paintings, shapes, and drawings, making it easier for them to understand difficult concepts; thus, leading to discoveries made suing more than one sense (Sternberg, 1989).

During the museum visit, museum guides were developed for examination by the students. The museum guide also included a relief museum plan. The museum guide provided additional information about the artistic and historical properties of certain artifacts to introduce and provide information about the museum collection that followed the tour route. The materials such as the museum guide, museum brochure, museum catalog, called written museum education materials in the present study, are developed for different groups and play an active role in learning both individually and under the supervision of an instructor (Atasoy, 1998).
One of the ways to significantly improve the appreciation of visually impaired visitors to the museum is to provide an audio description of an exhibition or performance (Salmen, 1998). In addition to the model and relief versions of the two paintings discussed in the museum, the audio descriptions were also provided in a simple language that visually impaired students can understand.

The museum presentation (social narrative) included thirty-five steps and was presented to the students one week before their visit to the museum. It was important for visually impaired students to have an idea about the museum before the visit. Information was provided about the museum rules, the situations and people that could be present in the museum, the physical features of the museum (corridor width, the location of the stairs and the toilet, etc.).

The application was conducted for six weeks. In the first week of the application, the author attended classes with the visual arts teacher to meet the 8th grade students in two branches and to inform them about the activities that will be conducted. Preliminary information was provided for the students that the author will participate in the visual arts course for a while and they will visit the museum. A pre-test was applied in the first class during the second week of the application. Pre-test questions developed in Braille alphabet were distributed to students and they were given 40 minutes to answer the test questions. In the second class, the museum presentation (social narrative) was presented before visiting the museum, providing information about the museum that will be visited and museum rules were provided. Later, in the third class, based on the 8th grade visual arts course curriculum achievements, the painting "Composition" by Cemal Bingöl, one of the painters of Abstract Art Movement, and the work

titled 'Alemdağ' by Halil Paşa, one of the impressionist painters, were explained to the students verbally and they were asked to create relief works with chamotte clay based on these works. Clay plates were prepared by the author beforehand for each student and modeling pens were distributed. The author helped the students to put on their aprons. Initially, coil and pinching techniques were instructed and the students were allowed to build the reliefs with these techniques. Each student was allowed to try these techniques, adequate time was provided for them to get used to the clay, and then the main work was initiated. Those who completed their works were asked to name their works. An instrumental piece was played during the application. The application was completed in one class hour. In the third week of the application, after obtaining the permissions, the students visited Gazi University Painting-Sculpture Museum. The whole museum visit was recorded on photographs and video. During the fourth week of the application, a post-test was applied to all students in one course hour to determine their artistic knowledge after the visit. In the fifth week of the application, the last step of the artistic application was conducted. The students were asked to create their own products based on Halil Pasha's Alemdağ and Cemal Bingöl's Composition paintings, which they observed through auditory and tactile senses in the museum. After the relief works were completed by the students, a meeting was held with the visual arts teacher in an empty class. One-on-one interviews were conducted with the students during the sixth and last week of the application.

2.4. Data Analysis

The Wilcoxon test was employed to analyze whether there was a significant difference between the pre-test and post-test academic achievement scores of visually impaired students before and after the educational activities conducted in the museum. The Wilcoxon test is used to determine whether there is a significant difference between the distributions of two correlated variable by comparison (Ural & Kılıç, 2011).

Relief work (document analysis) produced by students were analyzed with the rubric method. Rubrics are categorized as holistic and analytical rubrics. In the development of analytical rubrics, the analysis criteria and the number of performance levels are determined, and then the expectations are determined starting from the highest level. Analytical rubrics contribute more to the evaluation and measurement process, as they provide detailed and practical information (Çepni, 2011). The relief works produced by the students were analyzed with an analytical rubric developed by the advisor and the author. Four criteria and performance levels were determined for the rubric (between 1 and 5).

As the artistic products (document analysis) produced before and after the museum visit were tested, it was concluded that the internal consistency of the expert analysis was high and no significant difference was determined between the scores by the experts. Thus, instead of comparing the pre-test artistic application and post-test artistic application scores, the mean scores determined by the three experts were calculated and these were compared with the pre-test and post-test mean scores. The chi-square test was employed to determine whether there was a significant difference between the artistic product analysis of the visually impaired students before and after the educational activities conducted in the museum. The chi-square test determines the fitness of observed frequencies (f_o) and the theoretical (expected) frequencies (f_e) in non-parametric cases (Çepni, 2007, p.196).

In the second part of the study, qualitative data were collected with the case study design. The data collected with the interview technique in the case study design were recorded and a 31-page document was obtained. The analysis of the interview data was conducted with content analysis. The documents were read several times and the content was categorized based on codes and categories to finally determine the themes. The videos recorded during the museum visit were transcribed. Then, the transcripts were read several times and interpreted by the author, and the application was described in detail.

2.5. Validity and Reliability

The Cronbach Alpha coefficient was calculated to determine the internal consistency of the achievement test employed in the study. Before conducting the educational activities in the museum, the Cronbach Alpha reliability coefficient for the 24-question achievement test was calculated to determine internal consistency and found as 0.673, and the same coefficient was determined as 0.715 after the educational activities.

In the present study, in document analysis, 3 experts scored students' artistic works (reliefs) based on the rubric. The scoring criteria was based on a 5-point Likert type scale, and the internal consistency coefficients of the 4 items were as follows: The internal consistency of the 1st expert, who scored the artistic products produced by the visually impaired students before the educational activities in the museum, was 0.681, the coefficient was 0.843 for the 2nd expert and 0.811 for the 3rd expert; all coefficients were rather high. After the educational activities were conducted in the museum, high internal consistency coefficients were obtained as well: 0.760 for the 1st expert, 0.727 for the 2nd expert and 0.740 for the 3rd expert, who scored the artistic products produced by the visually impaired students.

To establish the content and face validity of the achievement test employed in the present study, the views of seven experts in different fields, namely special education, art education, and measurement and evaluation, were obtained. Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel (2014) reported that the development of the table of specifications that included topic-behavior comparisons provides important clues about the content validity in achievement tests. In the present study, a table of specifications was developed during the preparation of the achievement test.

The validity and reliability of the qualitative data was determined by method, resource, analyst triangulation and expert review. Patton (1980/2014) mentioned four types of triangulation in the confirmation of the validity and reliability of qualitative research. These included method triangulation, resource triangulation, analyst triangulation, and theory/perspective triangulation. Method triangulation entails the reconciliation of quantitative and qualitative data. It includes comparison and combination of qualitative and quantitative data. Method triangulation was conducted with both quantitative and qualitative methods in the study. Resource triangulation refers to the diversity of data resources. In the study, resource triangulation entailed the interview conducted with the visual arts teacher in addition to those conducted with the students, and detailed description of the videos and photos that covered the whole application. Analyst triangulation entails the analysis of the same qualitative data by two or more individuals independently and the comparison of the findings (Patton 1980/2014). The present study data were analyzed by two qualitative research experts, apart from the author. In

the study, expert review was also employed in the development of interview questions and the transcription of the findings. In expert review, a qualitative research expert is asked to review the research. The expert provides feedback to the author in the whole process, including research design, data collection, analysis and determination of the findings (Yıldırım & Şimşek, 2008). Since the whole application was recorded on video and photographs, all stages were described in detail and the study findings were presented via participant quotes.

3. FINDINGS

The findings of each research question determined in line with the general purpose of the research are discussed in separate sub-titles.

3.1. Quantitative findings

The significant difference between the pre-test and post-test achievement test scores of visually impaired students who participated in the education conducted in the museum was tested with the Wilcoxon test and the findings are presented in Table 2.

Table 2. *The Results Of The Wilcoxon Test Conducted On Achievement Test Pretest And Posttest Scores*

		Mean	**Std. Deviation**	**Z**	**p**
Achievement	Pre-test	7,50	3,75	-2,810	,005*
	Post-test	13,70	4,19		

*p<0.05

A significant difference was determined between the achievement scores of visually impaired students before and after the educational activities conducted in the museum ($p < 0.05$). The student achievement increased after the activities. This finding demonstrated that the education conducted in the museum with visually impaired students had a significant impact on the increase in the artistic knowledge of the students. In a previous study, Buyurgan (2009a) reported that when adequate physical conditions are created for visually impaired individuals and when purposive educational services are provided, learning would be more permanent and exciting. Hooper-Greenhill (1994) reported that museums are very powerful, ideal learning environments, and possess enormous resources such as collections, buildings, and staff. Furthermore, museums and galleries have an almost unimaginable potential to allow learning and entertainment.

The chi-square test was applied to determine whether there was a significant difference between the knowledge about the artist of the artistic product produced by the visually impaired students before and after the educational activities conducted in the museum and the findings are presented in Table 3.

Table 3. *The Results Of The Chi-Square Test Conducted On Pretest And Posttest Scores To Determine The Artist Of The Artwork*

			Post-test			
			Human/house/ tree/pond use in relief (Halil Pasha)	Circle/triangle/ rectangle/trapezoid use in relief (Cemal Bingöl)	Halil Pasha and Cemal Bingöl	Total
Pre-test	Human/house/ tree/pond use in relief (Halil Pasha)	n	3	3	0	6
		%	50,0%	50,0%	0,0%	100,0%
	Circle/triangle/ rectangle/ trapezoid use in relief (Cemal Bingöl)	n	1	2	1	4
		%	25,0%	50,0%	25,0%	100,0%
Total		n	4	5	1	10
		%	40,0%	50,0%	10,0%	100,0%
1,875 p=0,392						

There was no significant difference between the evaluations conducted by visually impaired students about the artist of the artwork before and after the educational activities conducted in the museum ($p > 0.05$). The experts were asked to determine which original painting was the basis of student artwork. In the pretest, it was determined that 19 reliefs were based on Halil Pasha's painting, 9 reliefs were based on Cemal Bingöl's painting, 2 reliefs were based on both Halil Pasha's and Cemal Bingöl's paintings. In the posttest, it was determined that 12 reliefs were based on Halil Pasha's painting, 15 reliefs were based on Cemal Bingöl's painting, and 3 reliefs were based on both Halil Pasha's and Cemal Bingöl's paintings. According to the experts, it was concluded that most students used Halil Pasha's Alemdağ painting before the application and most students used Cemal Bingöl's Composition painting after the application. However, there was no significant difference between the pretest and posttest original artwork scores. In other words, the original painting that inspired the students could not be determined. In the study, students were asked to produce reliefs based on any of the paintings, one of which was an abstract and the other was a landscape painting. The facts that the students were free to select the inspirational painting and the similar interest in abstract or landscape paintings could be the reason behind the indetermination of the artwork that inspired student artwork.

Chi-square test was employed to determine whether there was a significant difference between the artwork scores of the visually impaired students before and after the educational activities conducted in the museum and the findings are presented in Table 4.

Table 4. *The Results of the Chi-Square Test Conducted on Pretest and Posttest Artwork Scores*

		Mean	Std. Deviation	Z	p
Adherence to the original artwork	Pre-test	3,00	0,67	-2,326[b]	,020*
	Post-test	4,10	1,10		
The technique use	Pre-test	3,40	0,97	-1,461[b]	,144
	Post-test	4,10	1,20		
Composition	Pre-test	3,20	1,14	-2,401[b]	,016*
	Post-test	4,80	0,63		
İnterpretation	Pre-test	3,70	1,16	-2,050[b]	,040*
	Post-test	4,80	0,63		

*p<0.05

There was no significant difference between the artwork scores products of the visually impaired students before and after the educational activities conducted in the museum based on the technique use criterion (p> 0.05). Although it was explained before the application that the clay should be shaped by coil or pinching techniques, it was observed that the students experienced difficulties in applying the relief techniques since they never touched clay before and never utilized the relief technique, which could be the reason behind the lack of a significant difference between pre-test and post-test artwork scores based on the use of technique.

However, there was a significant difference between the pretest and posttest scores of visually impaired students based on adherence to the original artwork, and composition and interpretation criteria (p <0.05). The mean posttest artwork score of the visually impaired students was higher when compared to the mean pretest score based on all analysis criteria. It was observed that the artwork produced after the educational activities conducted with the visually impaired students in the museum were more effective. It was suggested that the higher posttest artistic achievements of the participants based on adherence to the original artwork, composition and interpretation criteria were due to fact that the pretest was applied on the student artwork produced after only a verbal description, while the posttest was conducted on the student artwork produced after the museum visit tailored for the needs of the visually impaired students. In other words, the activities conducted in the museum with copper relief paintings based on the two predetermined original paintings, models, the cloth-relief painting, the artwork tags developed in Braille alphabet, the museum guide, the museum introduction presentation, the forest scent and sounds, and the verbal descriptions of the artifacts were effective.

3.2. Qualitative Findings

The interview findings regarding the visit of the visually impaired students and the visual arts teacher to the museum and the education process in the museum were discussed under separate headings.

3.2.1. Findings collected from students with visual impaired

The interview findings about the museum visit by the visually impaired students and the education conducted in the museum are presented under three main themes: prior experience, application experience and recommendations. Direct student quotes are presented and interpreted.

Prior Experience: The distribution of student views on their previous museum experiences is presented in Table 5. The prior experience theme included the previous museum experiences category. It was observed that all students had more than one museum experience, all visits were organized by their school and their school prioritized such visits; however, their parents did not value museum visits.

Table 5. *Student Views on Prior Museum Experience*

Theme	Codes	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	f
Prior Museum Experience	Visited a museum before	1	1	1	1	1	1	1	1	1	1	10
	With school	1	1	1	1	1	1	1	1	1	1	10
	With family					1						1
	Tactile material	1		1	1	1	1	1	1	1	1	9
	No written material	1		1	1	1	1	1	1	1	1	9
	Expert guide			1		1					1	3
	Unanswered		1									1

All students (n = 10) stated that they had visited a museum before and visited the museums with their school. Only one student (n = 1) stated that he went to the museum with both his parents and the school. Examples of student responses are as follows: "*I went [to the museum] here (S2),*" *"We went with the school (S3),"* *"I went to Ataturk's Mausoleum when I was little. ... İntangible Cultural Heritage Museum (S5).*"

The majority of the students (n = 9) stated that there were only tactile material but not written material in the museums they visited before: "... There relief things next to the works at MTA. We both viewed and touched the works; I do not know maybe we got permission. After some things in Atatürk's Mausoleum, where did we go after that, we touched at İntangible Cultural Heritage Museum. I do not remember anything else (S10)," "Some of them were behind the glass. I could not touch those inside the glass, but we could touch those that were not in the glass, they were behind the glass at Atatürk's Mausoleum as well. I couldn't touch those behind the glass, but we touched what we could (S3)," "We touched planets and stones at the MTA Museum. (Museum Guide) No, such a thing has never happened in any museum before. It happened only when we went the other day (S6)," "Yes. For example, there were some items at Rahmi Koç Museum, we touched them. We were permitted (S4)," "There was none (S1)," "Well, we were

paired as students with and without vision. The teacher explained to us. Those with vision saw, those who did not listened. (S11)"

Only three students (n = 3) stated that there was an expert guide in Atatürk's Mausoleum and MTA Şehit Cuma Dağ Natural History Museum that they visited before. It was determined that the students previously visited İntangible Cultural Heritage Museum, Atatürk's Mausoleum, the Old Parliament, the MTA Şehit Cuma Dağ Natural History Museum, and the Rahmi Mustafa Koç Museum. The students stated the presence of an expert guide as follows: "*Reliefs were not available. There were tours in MTA and Atatürk's Mausoleum (S10)," "There was. In the abstract [museum], sometimes my teacher Özlem explained, and my older brother explained in the museum at Atatürk's Mausoleum (S3)," "Apart from you, there were elder sisters [guides] in several museums (S5)*". One student (n = 1) did not respond to the question on the presence of guides, written or tactile material in the museums.

Application Experience: The distribution of student views on application experience is presented in Table 6. The application experience theme included the "it facilitates learning, visiting the museum was enjoyable due to the activities, and the interest in tactile activities was high" categories. It was determined that the experience of all students in the museum facilitated their learning, they particularly liked the activities such as touching models and relief paintings and had fun during the experience.

Table 6. *Student Views on Application Experience*

Themes	**Codes**	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**	**S10**	**f**
Facilitation in learning	Effective on learning	1	1	1	1	1	1		1	1	1	9
The liking visiting the museum with activities	Liked the museum	1	1	1	1	1	1	1	1	1	1	10
	Finding boring	1										1
An interest in tactile activities	Liked the model	1		1		1	1				1	5
	Liked the relief paintings						1		1	1		3
	Liked the touching sculptures									1		1
	Liked them all of activities		1		1			1				3
	Meet the expectation	1		1	1		1	1	1	1	1	8
	Unanswered		1			1						2
Allows the perception of the two-dimensional surface	Comfortable perception with sensory activities	1	1	1	1	1	1	1		1	1	9
	Unanswered								1			1
İmproves	Positive contribution			1	1	1	1	1	1		1	7

artistic applications	to relief work				
	Undecided	1		1	2
	Unanswered		1		1

The students indicated that visually impaired individuals could learn only by touching, similar to the activities conducted during their museum visit. The majority of the students (n = 9) stated that the applications conducted in the museum were effective on learning: "*Actually, it worked a little. That's why I had some difficulties when you tested us for the first time, but now I did not experience any difficulties (S1),*" *"I think it worked. Because if we didn't touch it wouldn't mean anything to us. Especially for the visually impaired (S4),*" *"Yes, because I understood better (S6),*" *"Yes, for example, I learned many concepts about painting that I never knew (S10),*" According to Atasoy (1998), instruments that could be considered as written educational museum tools such as museum guide, museum catalog, museum teacher guide, handouts, museum brochure, museum worksheet were prepared for the use of different groups of visitors and play an active role in individual learning or learning/experimentation under the supervision of an instructor. It was suggested that the museum guide, utilized during the museum visit, helped students to learn.

All students (n = 10) stated that they liked the museum. Students stated the following: "*I liked it (S5),*" *"For example, I liked the event we did with you. ... I liked it, it was nice (S3).*" Only one student (n = 1) stated that the museum was nice but boring towards the end of the visit: "*It was just a bit boring, but it was nice (S1)*".

During the activities conducted in the museum, it was observed that half of the students (n = 5) stated that they like the models. Certain students stated the following: *"The models were nice (S3),"* *"Examining the models and the paintings (S6).*" Some students (n = 3) liked relief paintings: *"Relief paintings (S8)"*, and only one student (n = 1) liked to touch the sculptures: *"Touching paintings and sculptures. ... the relief painting (S9)*." Some (n = 3) stated that they liked all activities: *"I do not know, I liked them all (S7),"* *"I frankly liked them all (S4)."* It was determined that the educational activities conducted in the museum that allow the participation of visually impaired students by touching increased their interest and participation.

The majority of the students (n = 8) stated that the activities conducted in the museum met their expectations. Certain students stated the following: "*Actually, it met [my expectations] a little, yes, let's say that we normally go to every museum, normally they block the works to prevent us from touching them. We wonder what it is like, how is the texture? For example, we want to touch or something. Normally, we cannot touch them when the works are blocked, and it becomes more boring during narration (S1),*" *"Yes, it was, I was expecting things about painting, they were already there (S10).*" Only two students (n = 2) did not answer the question.

The theme of application experience included the category of activities that aimed the senses allowed the perception of the two-dimensional surface. It could be suggested that the students could perceive the mostly two-dimensional paintings due to the sensory activities conducted in the museum and created an image for these paintings in their minds. According to Onur (2010), orientation towards aesthetic sensitivity, senses, imagination, creativity and critical approach in museum education was much more important when compared to providing facts and

information. Learning in a museum is based on using the senses; thus, the museum should allow the touching and close observation of the objects under appropriate conditions. Almost all students (n = 9) stated that they perceived the two-dimensional surface easily thanks to sensory activities conducted in the museum. Certain students stated the following: *"I understood more easily (S10)," "Yes, it worked (S6)," "Yes, it was nice, frankly, I have never seen such a thing in other museums, it was the first time (S4).*" Only one student (n = 1) did not answer.

The theme of application experience included the category that the museum visit improved artistic applications. In the production of reliefs after the museum visit, it was observed that the products were more successful when compared to the previous artwork. Most students (n = 7) stated that the museum visit contributed to the relief work. Certain students stated the following: "*Of course, yes (S6)," "That is what I think (S4)," "Yes it was (S5)."* Two students (n = 2) were undecided and one student (n = 1) did not answer.

Recommendations: The recommendations of the students to the teachers, parents, and museum administration are presented in Table 7. The theme of recommendations included the tactile activities in museums, personnel and companion support categories. The students stated that visually impaired students perceived better by touching; thus, they desired tactile applications such as models, relief paintings, a museum guide prepared in Braille, and work tags in the museum.

Table 7. *Student Recommendations to Teachers, Parents and Museum Administration*

Themes	**Codes**	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**	**S10**
	f										
Touch-based activities	Similar activities should be organized in other museums (models, Braille work tags and museum guide, relief paintings) 8	1		1	1		1	1	1	1	1
Personnel and companion support	Applications that allow perception and learning					1					1
	Presence of a companion							1			1
	Presence of a museum guide									1	1
	Unanswered		1								1

The majority of the students (n = 8) stated that similar activities should be organized in other museums (models, Braille work tags and museum guide, relief paintings): "*For example, the guides should have relief things. There should be relief paintings and models. They should include explanations (S3)," "(Museum guide) So I think it should be in every museum (S4)," "We should touch everything that we can touch, other than that, the things that we cannot touch should have relief explanations. Year of the historical artifact, who produced it. Info tags (S6)," "For example,*

we had a guide the last time. There were many things. So, I can't think of anything else…. For example, every museum can print that booklet in Braille with a guide with typical vision… (Model, relief painting) Of course, visually impaired people can perceive better by touching (T10)."

One student (n = 1) stated that there should be applications that allow perception and learning: "*At least [there should be applications] that would allow us to perceive, learn* (S5)". One student (n = 1) stated that companions for visually impaired individuals could be provided: "*There could also be one that sees [with typical vision] next to a visually impaired. A companion. He can narrate. He would allow him to touch the sculpture he explains* (S8)."

Another student (n = 1) explained the requirement for a museum guide as follows: "*There are usually (expert) guides… Actually, there is not much need for a relief guide. (there should be an expert guide) I think so. It could be a model. For example, there could be reliefs (S9*)." One student did not answer.

In the interviews, it was determined that the fact that activities were conducted only on two works in a single hall during the museum visit surprised two students. Considering that in museum visits, all museum is seen, and applications are not conducted on selected works, the surprise of these students was perceivable. The students stated the following: "I liked it but we only looked at two paintings, it was a little strange. Normally, when they take us to the museum, they allow us to visit the whole museum (s10)," "But we visited only one place (S9)." According to İlhan (2010), it is not necessary to see the whole museum during museum visits. The museum education, which mainly focuses on an object, idea, and a period, includes workshops and creative drama application that support new achievements. During the activities conducted in the museum, the students were allowed to touch the oil painting, wooden geometric forms, a walnut, two plaster and stone sculptures. In the interviews, it was determined that these materials attracted the interest of the students and they liked them.

3.2.2. Findings collected from the visual arts teacher

The findings collected with the interview conducted with the visual arts teacher on the museum visit and the education application conducted in the museum revealed five main themes: general attitude towards the museums, preparation for the museum visit, problems experienced in the museum, application experience, and recommendations. Direct quotes and interpretations are presented in the following section.

General Attitude Towards the Museums: The teacher's prior museum experiences revealed the categories of reluctance to visit the museums and current museum services under the theme of general attitude towards museums.

It was suggested that the visual arts teacher who rarely visited museums was unwilling to visit the museum. The teacher stated that (s)he visited museums previously both individually and with students, but visiting museums, especially with blind children, was pointless and useless, since museums lack special applications such as tactile facilities for visually impaired individuals. It was observed that inadequate educational and physical facilities offered by museums for visually impaired students negatively affected the teachers of students with special needs about museum visits. The teacher stated the following: "*I don't visit [the museums] often,*

the last time I visited one was two years ago. Finally, we visited the museum with you. I mean, we visited museums with students, but they were mainly visual and there was not much tactile facilities for visually impaired children. Otherwise, we went with the students, we visited MTA. AT Atatürk's Mausoleum, the students could touch the places that needed to be touched. They have done something for us, but you know, in general, there is nothing, there are no tactile facilities to help total children."

The teacher stated that the current museum facilities were insufficient for the visually impaired, they were allowed to touch certain objects in one or two museums; however, only touching was not sufficient, there should be applications such as drama that would allow the students to visualize the objects with a multi-dimensional narrative. Visually impaired individuals cannot visualize abstract concepts. Thus, several resources that would facilitate their perception by transforming abstract concepts into concrete objects should be available. Museums could provide access to visually impaired individuals with activities that aim other senses and that allow the participation of these individuals. The views of the teacher were as follows: "*They could touch certain objects only in MTA. They produced plastic animal models and they allow touching these. Stones and others, but some things remain abstract. It does not fit properly. Just touching is not enough, it is a physical feature of this animal or object. If it is a painting, it could be narrated, how is the environment, even they could be allowed to replicate the human posture, it would be better in the form of a drama. They could imagine it better," "It is like this; if the study was larger, this could be done. It could be done with drama. If the physical condition of the school, etc., the facilities were sufficient, it could have been. Like, there's a tree over there, there is a house over here. … Of course, it would be more permanent with drama.*"

The teacher stated that current museum services provide only limited benefits for the students, they only experience verbal narrative, verbal expression could only be perceived by certain children based on the intelligence of the child; however, children with different perception levels could not understand these narratives and do not learn anything during museum visits. The teacher stated that for the visually impaired individuals to benefit from the museum visits, the education departments of the museums should determine the requirements based on the type of disability and improve the service quality in the museum: "*Well, in fact they visit, there is narrative, verbal narrative. Is this a benefit? It differs from one child to another. It varies between the children," "Sure. This is related to kid's intelligence. A good kid could get it with verbal description. But there are those who won't. That is why it remains unfulfilled, the words fly away. Some things, especially, fly away*."

Preparation for the Museum Visit: The preparation for the museum visit theme included preliminary preparation category. The teacher stated that they never made any preparations with visually impaired students before the museum visits previously, they went unprepared, or even (s)he did not felt a need for it because the museums provided guides, and they visited the museums with the help of the guides: "No, the museum always provide a guide, someone always helps. We do not prepare anything." Only a few Turkish museums provide tactile activities for individuals with visual impaired in guided tours, only an audio narrative is available. Teachers have more responsibilities given the limited nature of the services. It could be suggested that preliminary preparations such as worksheets and museum guides that are associated with the curriculum would allow the students to benefit further from the museums.

Problems Experienced in the Museum: The problems experienced in the museum theme included the inability to comprehend the museums category.

Among the problems experienced in the museum during the previous visits, the failure of the students to understand the museums was stated as the most significant problem. The teacher stated that tactile facilities are not available for the students where the students require to comprehend by touching, therefore the students could not fully grasp, understand and visualize the objects. The teacher stated that in cases where a narrative is not available, no information could be obtained, while these problems could be overcome with applications such as sounds, images, models, allowing the child to learn the physical structure of the object. The teacher stated the following: "*How should I say it, the things that the children could grasp by touching, in most cases, they could not touch. As such, the children cannot fully grasp. They cannot understand or visualize anything. There is such a problem. Also, the narratives are also limited. The same happened at Atatürk's Mausoleum, the narratives did not serve the purpose, the same happened at the MTA, there were narratives, but it was not [proper], it should be accompanied with sounds, images, models so that this child could understand the structure and physics. You know, though I instruct animals here, the fifth-grade studies animals all year; the shape of the animals, their sounds, etc. I instruct these to allow them to have some information, as much as possible.*"

Application Experience: The main theme of application experience included the categories of contribution of the application, student attitudes towards the application, improvement of communication, encouragement of similar museum applications, analysis of the application.

The contribution of the application could be analyzed for the contribution to artistic knowledge and artworks. The teacher stated that instructed art movements, artists, types of painting, design elements and principles, and criticism of artworks contributed to student learning, and especially the models contributed to the artworks produced by the students: "*Of course it contributed. For example, I do not do anything with children about paintings, I do not provide information. I do not provide any information about the genres such as landscape, etc. It was nice, it was good in that sense. At least the child learned what landscape is. The model you produced was three-dimensional, it was very beautiful, it was very good. The studies would demonstrate the feedback. At least in certain ones. It could be observed in children who grasped well. It was great in that sense. At least abstract/concrete concepts, artificial texture/natural texture, these I have instructed long time ago.*" Furthermore, the teacher stated that students with low vision and blind students used to be in different classes, and they conducted different instructions, and but the teacher has not provided information for two years and conducted different instruction due to the fact that the classes now include students with varying visual impaired: "*Yes, in the past, classes with low vision and total blindness were separate. Now, the kids are mixed, before I conducted specific instructions with them. At that time, the children learned the instructed information, but now I have not been conducting different instructions for two years. So, it was nice*." The teacher stated that the information given during the application filled the knowledge gap of the students since (s)he did not provided information about arts during the course.

The teacher stated that the student attitudes towards the application were enthusiastic and interested, the learning was accomplished thanks to the application, student participation was high, and the students were especially interested in the models: "*At first, they were very*

enthusiastic and very interested. (…) They learned," "(The participation) was high, good. Things were nice," "I think they were more interested in the model. They liked it."

It was determined that there was an improvement in the communication of the students with their peers and with the author due to the impact of the application conducted in the museum. The teacher stated that the visit to the museum was very successful, since they could easily answer the questions and the author could easily received feedback: "*Of course, they could answer your questions easily. You received their feedback easily. So, the museum was successful. Yes, it was very successful.*"

It was identified that the teacher was encouraged to conduct museum applications similar to the museum visit conducted with the author. The teacher stated that (s)he could organize similar visits if there would be no obstacles and if the adequate conditions would be available: "*If the conditions are suitable, if there are no obstacles associated with the children, why not? Actually, such organizations have only recently started.*"

When analyzing the application, the teacher stated that visually impaired students need to drain their energy periodically, but the students were patient during the museum visit due to the flow of activities and continuous movement: *"…They were patient enough. Because there was constant movement, it was not boring and monotonous, so they acted well.*" The teacher stated that they could imagine the narrated works, they loved the model, the hand coordination of visually impaired children is not perfect; thus, the three-dimensional models are more useful when compared to relief paintings. The teacher stated that the most effective activity during the application was touching the model and the relief paintings: "I think that they could imagine at least one painting very well," "Of course. They really liked that model," "Some cannot comprehend very good by hand, but of course, yes, for children who can imagine it in their minds. But three dimensions are not the same. Three-dimensional is very different. The relief was a little…," "Yes of course. Model is always, three dimensions are a little..ç" According to Atasoy (1999), completion of the inaccessible works is ensured in the museums thanks to the models, replicas, model-like supplementary material, or workshops based on the works exhibited in museums. These materials could allow learning by doing and living both in museums, school environment and a mobile environment.

Recommendations: The categories of activities that aim the senses and institutional preparations were determined in the theme of recommendations on the benefits of museums for visually impaired students.

The teacher stated that visually impaired students could benefit from museums through "activities that aim the senses", especially painting descriptions, reinforcement with three-dimensional materials, sound effects, and the museum settings supported by adequate material and activities where they can use their tactile, auditory, and olfactory senses: "It would be more effective if it would be reinforced with descriptions and three-dimensional materials. I have nothing else to say. I don't know, it could be a landscape, a stream or something else, if the involvement includes the sound of water, a bird etc., it will be much more effective if it is combined with three dimensions. Supporting the shape with sound with sound effects, three-dimensional, compared to a painting," "Of course. Even the sense of taste. [The student] would

smell it, lick it if necessary. He would want to taste it," "These should be allowed. The material for this, the material could be touched and licked, tasted if necessary."

The preparations of the institutions such as schools and museums are important for the efficiency of museum visits for visually impaired individuals. The teacher suggested that schools should inform the museum administration in advance that visually impaired students will visit the museum and the museums should be ready for these visits: *"… There is something like that, when the museum administration is informed before the visit and they are ready, they could immediately present and provide this service.*"

Finally, the teacher stated that students liked all applications, it was a good effort, a completely different application was conducted, and (s)he was also pleased about conducting activities and providing knowledge that (s)he never conducted or provided: "*In fact, it was great work, thank you. At least you've done something for the kids that I never did. Thank you for that. At least it was a study about the arts course. Because I could not do it*." The teacher stated that the enthusiasm of the students was low due to adolescence and certain ongoing problems among them, otherwise the feedback could have been better: "*If you leave them alone, there will be trouble. If you ask them, they would not want to do anything. The students are like that this year. The students in previous years were curious and enthusiastic. These are different*."

Overall, it could be suggested that museum education was beneficial for individuals with visual impaired and the application attained its goals.

4. RESULTS, DISCUSSION AND RECOMMENDATIONS

In the study, the comparison of the achievements of visually impaired students before and after the educational activities conducted in the museum demonstrated that the achievements of the students improved after the activities. This finding suggested that the support of three-sensory education for visually impaired students in an art museum with activities such as models, relief paintings, audio descriptions, Braille museum guide and artwork tags facilitated learning and had a significant impact on the increase in their artistic knowledge. Previous study findings support the conclusion that educational activities conducted in the museum contribute to student learning. In a study conducted by Buyurgan (2009a) on the expectations of university students with visual impairment about the museums, it was observed that the efficiency of the museum visit, supported by special learning methods for visually impaired individuals and included auditory information, touching, verbal descriptions, questions and answers, and applications was high. It was determined that learning was more exciting and permanent when physical conditions required by individuals with visual impairment were available in museums and when purposive educational services were provided. In another study conducted by Buyurgan (2009b), a high learning potential museum visit was organized for students attending the department of education for visually impaired individuals, and a separate learning by touch program was developed for a completely blind student attending in the same class. The majority of students attending the department of education for visually impaired could see, but after graduation, they will be instructing visually impaired students. During the scheduled museum visit, the pre-service teachers were provided with a method and experiences they can use in their profession. In the study, the students learned the lifestyles, belief systems and artwork of Anatolian civilizations using real objects, through a planned museum visit, where learning was

relevant and exciting, active, and permanent learning was acquired through information exchange, questions and answers, worksheets and minting applications. Planned museum visits allow students to understand the importance and difference of learning in a museum, learn how to organize an effective museum visit for visually impaired students, and live through this experience. The findings of the studies conducted by Buyurgan (2009a and 2009b) revealed that learning was more effective and permanent when adequate physical conditions were available for visually impaired students in museums and supportive education services were provided.

In the study, the qualitative findings collected with the structured interviews conducted with visually impaired students and visual arts teacher after the educational activities in the museum revealed a significant difference between the pre-test and post-test achievement test scores, consistent with the quantitative findings. The interviews conducted with ten students and one teacher demonstrated that educational activities conducted in the museum contributed to learning of visually impaired students. Nine out of 10 students stated that educational activities conducted in the museum contributed to their learning. Visual arts teacher also stated that the museum visit, which was conducted with several sensory education activities, improved the artistic knowledge of the students. In a study by Buyurgan & Demirdelen (2009), the role and significance of tactile and auditory information, and the museum in learning of visually impaired individuals were determined with a completely blind university student. Learning in the museum was conducted with auditory descriptions, copies of certain predetermined works, touching and feeling these copies, questions and answers, worksheets and applications conducted in the museum education workshop, and it was concluded that a planned museum visit, which was conducted based on special learning methods, was effective in the instruction of Anatolian civilizations' lifestyles, beliefs and arts. The findings reported by Author were consistent with the present study finding that the artistic knowledge of the visually impaired students increased after the educational activities conducted in the museum with the support of tactile, auditory and olfactory senses.

On the second sub-problem of the study, " Is there a significant difference between the pre-test and post-test artistic application scores of visually impaired students who participated in museum education?", there were no significant differences between the analysis of the original artist of the artworks produced by visually impaired students before and after the educational activities conducted in the museum. Ten students produced relief paintings before and after the educational activities conducted in the museum based on either one or both original paintings, namely Halil Pasha's “Alemdağ” and Cemal Bingöl's “Composition.” However, it was observed in the pretest that Halil Pasha's Alemdağ painting was used predominantly, and in the posttest, it was observed that Cemal Bingöl's Composition painting was predominantly. There was no significant difference between the pre-test and post-test scores for the original artist of the student artwork. In other words, it was not possible to determine the original painting that inspired the students when producing their relief paintings.

No significant difference was determined between the posttest and pretest artwork technique scores of visually impaired students. However, there was a significant difference between the pretest and posttest adherence to the original work, composition and interpretation scores of visually impaired students before and after the educational activities conducted in the museum. Based on all analysis criteria, the mean artwork score of visually impaired students was higher

after the activities when compared to the pretest mean score. The posttest artistic applications were more successful in the study since the pretest artistic applications were produced only after an audio description, while the posttest artistic applications were produced after the educational activities conducted with copper relief copies of the paintings, models, relief paintings covered with fabric, artwork tags in Braille alphabet and museum guide, the museum presentation, forest smells and sounds, and verbal descriptions of the works.

Altay (2009) reported that students with visual impairments learned the collage technique and produced successful works after they examined a relief copy of a painting using auditory and tactile senses. The study findings were similar with the present study findings on the use of tactile and auditory senses by students with visual impaired and the production of a relief copy of a painting. Furthermore, the study findings supported the present study finding that educational activities conducted in a museum improved the artwork produced by the students.

It could be suggested that the education conducted for visually impaired students in the art museum contributed to artwork of visually impaired students due to the activities that aimed three senses, developed models, relief paintings, relief paintings covered with fabric, audio descriptions, Braille museum guide and artwork tags. The qualitative findings of the study collected with the structured interviews conducted with visually impaired students and visual arts teacher after the educational activities in the museum were consistent with the quantitative findings of the study. Visual arts teacher and 7 out of 10 students stated that educational activities conducted in the museum contributed to their relief artwork.

On the third sub-problem of the study, " What are the views of the visually impaired students on the museum visit and education process in the museum?", the structured interviews conducted with visually impaired students revealed three main themes: prior experience, application experience and recommendations.

Within prior experience category, the previous museum experiences of visually impaired students were determined. It was determined that all students have visited museums before with the school and there were materials that they can touch in the museums that they visited. It was concluded that no written materials were available for them and only 3 students visited the museums with a guide. Based on the views of the visually impaired students on application experience, it was concluded that the museum visit facilitated learning, the activities and the museum visit were enjoyable, and the interest in tactile activities was high. All students stated that they liked the museum and museum activities. Almost all students stated that the educational activities conducted in the museum contributed to learning. This present study finding was consistent with the quantitative study findings. Sternberg (1989) reported that learning in a museum is informal and unstructured activity; quite different from the formal and structured form of learning available in the classroom. Visitors are not subject to classes, courses or exams. Instead, they have the opportunity to explore and learn on their own. Especially, art museums allow their visitors to acquire information from various resources. Sternberg stated that learning could take place during a museum visit, with instructive tags, gallery guides, brochures, lecture presentations, audio tours or tours led by expert guides.

They stated that they especially loved tactile activities such as models, relief paintings and sculptures, and these activities exceedingly met their expectations of the museum. As Sternberg

(1989) reported, tactile materials and objects in museums illuminate learning goals, stimulate the senses and meet the human need to touch. Also, this hands-on approach allows the visitor to convert abstract concepts to concrete information. In the study, almost all students stated that educational activities conducted in the museum allowed them to perceive the two-dimensional plane. The fact that the majority of the students stated that the museum visit improved their artwork was consistent with the quantitative study findings. It was concluded that the museum visit for visually impaired students supported by sensory activities contributed to the artworks produced by the students.

Based on the data obtained for the third study sub-problem, students recommended that tactile activities that entail models, relief paintings, museum guide, etc. should be present in museums for an effective visit by visually impaired individuals and the museums should provide staff and companion support.

On the fourth sub-problem of the study, "What are the views of the visual arts teacher on the museum visit and education process in the museum?", the interview findings revealed five main themes, including general attitude towards museums, preparation for the museum visit, problems experienced in the museum, application experience, and recommendations.

Smith (2002) argued that if the participation of the visually impaired individuals are encouraged sufficiently, they could constitute a significant part of museum audiences and significantly benefit from museum visits. The visual arts teacher was unwilling to visit museums in general. In particular, the teacher stated that visiting the museum with visually impaired students was meaningless and useless due to the lack of tactile activities and special services for these students. Furthermore, the teacher stated that the current museum facilities for visually impaired individuals, especially tactile, drama-based and multi-dimensional activities, were inadequate. The teacher stated that only audio descriptions are available in museums for visually impaired students, which is inadequate for children with various perceptive skills; thus, the benefits of the museums for visually impaired students were limited.

It was determined that the visual arts teacher did not conduct any preparations before visiting the museum with visually impaired students and mostly utilized the guide service available in the museums. Based on prior museum experiences, the teacher stated that they experienced certain problems in the museum with visually impaired students. The teacher stated that the visually impaired students could not fully comprehend, understand or visualize the museums due to the lack of tactile applications and inadequacy of verbal descriptions. Smith (2002) reported that both relief copied of artworks and tactile signs would greatly help the effectiveness of the visits of visually impaired individuals.

The visual arts teacher stated that conducting educational activities in the museum contributed to the artistic knowledge and artworks of the students. The teacher stated that students' attitudes towards the application were enthusiastic and interested, their participation was high and they especially exhibited a lot of interest in the model, and there was an improvement in the communication between the students and with the author. It was determined that the teacher was encouraged to conduct similar museum applications if the obstacles for visually impaired children could be eliminated and adequate conditions could be provided.

According to Özgür (2013), the use of miniature models by feeling with the palm and fingertips to acquire an impression about the form of entities could eliminate the limitations of the lack of vision to a certain extent. In the present study, as Özgür stated, a miniature replica of the painting was produced by the author to allow the visually impaired students to perceive the shapes of the objects in the painting by feeling them with their palm and fingertips. The visual arts teacher stated that the works of the two artists were reflected well in the students' imagination, and the model worked better than the relief paintings due to the lack of good hand coordination.

The visual arts teacher suggested that sensory activities and institutional preparations should be conducted in the museums for visually impaired individuals. The teacher stated that museum settings supported by adequate materials and activities where tactile, auditory, taste and olfactory senses are utilized, would lead to an efficient visit. The teacher suggested that schools should inform the museum administration in advance that visually impaired students will visit the museum and allow the museum to conduct necessary preparations. The visual arts teacher of the visually impaired students stated that all applications were appreciated by the students, it was a good effort, a totally different application was conducted, and was pleased with the fact that activities that (s)he did not conduct were conducted and information (s)he did not provide was provided.

In conclusion, it was observed that the educational activities conducted in the museum contributed to the artistic knowledge and artwork of the visually impaired students, the students liked the museum visit and applications which helped their improvement, and the teacher considered all applications effective and efficient.

Based on the study findings, the following could be recommended for future practices:
- Education departments for the disabled could be established in museums, and educational activities based on tactile, taste, auditory and olfactory senses for visually impaired individuals of all age groups could be improved, physical access of these individuals could be facilitated, and museum staff who would support both education and physical access to the museum could be trained.
- Museums could allow visually impaired visitors to touch some works in their collections, and in cases where it is not possible, three-dimensional models and models of important pieces of the collection could be provided. To allow the perception of the artifacts by visually impaired individuals, especially in art museums, the relief copies of two-dimensional paintings could be provided, or the paintings could be animated with real objects.
- Museums could provide multimedia tours for visually impaired visitors, a floor plan printed in large font and Braille, museum guides, work identification information, and magnifiers. Furthermore, they can prepare social narrative guides that include verbal descriptions, photographs and short descriptions to allow the visually impaired children to know what awaits them in the museum and what they will encounter during the visit.
- Based on the study findings, it could be suggested that teachers should also conduct similar sensory applications during museum visits and preparations before the visits.
- Future similar studies could be conducted with different museum types and disability groups.

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