Reading Artwork With 3D In Painting

Resim Sanatında 3D İle Eser Okumak

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ABSTRACT

Artwork analysis has been practiced by experts in the field for centuries with traditional methods. The innovative approach brought by the technology that developed with the industrial revolution also changes the methods used in the work analysis process. The aim of this study is to examine the works of art through 3D software and to evaluate the foreground elements of the work in all its details, including the information about the period in which it was made. The sub-objectives of this study are to get to know the works of famous artists more closely by the society, to strengthen the bond between the audience and the work, and to make the works of art more understandable because they can reach all segments of the society. In line with these purposes, Osman Hamdi Bey's "The Tortoise Trainer" was reconstructed using 3D modeling software and a visual analysis of the obtained data was made. The study was designed according to the qualitative research model. The theory of the research was made according to the historical pattern, and the sources were reached with the literature review technique. With 3D modeling software, different works of art can be evaluated in terms of art criticism and can present original perspectives on the works. In this respect, the study constitutes an important resource for art criticism research to be carried out with 3D modeling software.

Keywords: 3D, Digital Art, Osman Hamdi Bey, The Tortoise Trainer, painting

ÖZ

Sanat eseri analizi, bu alanda uzman kişiler tarafından yüzyıllardır geleneksel yöntemlerle uygulanmaktadır. Sanayi devrimiyle birlikte gelişim gösteren teknolojinin getirmiş olduğu yenilikçi yaklaşım, eser analizi sürecinde kullanılan yöntemleri de değişikliğe uğratmaktadır. Bu çalışmanın amacı, sanat eserlerini 3D yazılımlar aracılığıyla ele alıp incelemek ve yapıtın ön plan elemanlarını yapıldığı döneme dair bilgiler dahil olmak üzere tüm ayrıntıları ile değerlendirebilmektir. Toplum tarafından, ünlü sanatçılara ait eserlerin daha yakından tanınması, izleyici ve eser arasındaki bağı kuvvetlendirmesi, sanat eserlerinin toplumun her kesimine erişebilmesi dolayısıyla daha anlaşılabilir olması bu çalışmanın alt amaçlarını oluşturmaktadır. Bu amaçlar doğrultusunda araştırmada Osman Hamdi Bey'in "Kaplumbağa Terbiyecisi" adlı eseri 3D modelleme yazılımı kullanılarak yeniden kurgulanmış ve elde edilen verilerin görsel analizi yapılmıştır. Çalışma nitel araştırma modeline göre desenlenmiştir. Araştırmanın kuramsal, tarihi desene göre yapılmış, literatür tarama tekniği ile kaynaklara ulaşılmıştır. 3D modelleme yazılımı ile farklı sanat eserleri sanat eleştirisi bakımından değerlendirilip, eserlere yönelik özgün bakış açıları sunabilir. Bu yönüyle çalışma, 3D modelleme yazılımı ile gerçekleştirilecek sanat eleştirisi araştırmalarına önemli bir kaynak oluşturmaktadır.

Anahtar Kelimeler: 3D, Dijital Sanat, Osman Hamdi Bey, Kaplumbağa Terbiyecisi, resim

Introduction

In the history of humanity, the concept of technology first entered our lives with "hand technology". The first paintings seen on the walls of Altamira and Lascaux caves were made with the help of "hand", which was also used in the period and can be called the only technology of the period. Therefore, the concept of technology can actually be defined as a familiar concept (Uğurlu, 2008, p. 247–260).

Özsezgin said that from the moment a person stepped into the world of existence, he researched various methods of being able to dominate his environment and those around him, and he made a great effort to make objects useful for himself. As a result of this effort, new steps taken in the field of science and new inventions gave birth to the concepts of industry and industry and showed a rapid growth after this process (Özsezgin, 1993, as cidet in Renkçi Taştan, 2016, p. 172).

Along with the developing world, the industry has transformed the tools of the age into tools of art. The artist involved in the artistic creation process, on the other hand, could not save himself from cooperating with technology today, and at the same time, he could astonish his audience with the help of a button if he wanted to. As a consequence, the developing world and industry have turned the tools of the age into tools of art at this point (Coşkun, 2016, p. 79).

While the scientific and technological developments brought by the 20th century were sometimes used as a theme in the works of artists, they also allowed the works to be revealed with technology, thus emphasizing the importance of interdisciplinary unity (Bingöl & Bingöl, 2018, p. 107).

The use of different materials in contemporary art and the increasing prevalence of interdisciplinary studies have revealed the artist's desire to reveal his work without using paint. Although paint is still dominant today, artists have put forward the idea that different materials should be used. The inclu-

sion of technology in art can be considered an effective material in our age.

The conceptual framework of the research was shaped by the relationship between painting art and technology, 3d modeling, and scanning the sources of possibilities brought by digital technologies. In the theoretical research on contemporary art, digital artworks, the examination of artists and their works using computer-aided 3D software, the interpretation of the technological images obtained and the 3D modeling of the determined works of art after an application study has been determined as a comparative work interpretation with the original data.

The outcome of literature review, it was seen that no analysis or examination was carried out in order to better recognize and promote the works of art belonging to famous painters, to establish a stronger bond between the work and the audience, and to make the works more understandable for all segments of the society, through 3D software.

Also, it has been determined that no technological software is included in this process in making the criticism of the work.

Referring to these shortcomings, "How to read a picture with 3D?" identified as the problem statement. The research and application work carried out was structured and concluded around this problem.

Method

Qualitative research model was used in the study. The text defined the qualitative research model as the holistic presentation of perceptions and events in the natural environment by using qualitative data collection tools such as observation, interview and document analysis (Metin, 2015, p. 15). The aim of those who do qualitative research is to examine the theories created on an empirical basis more deeply, to strengthen the theories created, as well as to reveal new theories (Seggie and Bayyurt, 2021, p. 17).

Literature review technique is also another technique used in the research. 3D modeling software was used in the application phase of the research. The link between the data obtained from the historical pattern and the 3D modeling has been plasticized. The plastic elements of the painting were realized with an application study focused only on the front structural elements by using the art criticism method.

The work used in the application belongs to Osman Hamdi Bey, an artist of the Ottoman Period, and it is a work that contains reflective elements created with the layout of the space.

In the scene, which was designed with Sketchup, one of the computer-aided 3D modeling software, the photo matching technique (mach photo) included in the software was used as a method. After a digital image belonging to the work is imported into the program, the origin note is marked and perspective escapes are created on the photograph. The surfaces were created by drawing lines over the perspective escapes created, and the objects seen on the work were modeled exactly. The visuals obtained from the tile panels of the surfaces in the space are covered on the created surfaces and it is aimed to be the same as the reality of the space. As a result of the coating process, the light settings were made and the rendering process was performed.

In the part of historical research and reconstruction with 3D, the preliminary structure of the painting was evaluated with the method of art criticism. Art criticism is based on two separate structures, the front and the back. While the front structure is defined as plastic elements that can only be seen, the back structure is the information-based data related to the date and place of the work or design product, and the life of the artist - historical, economic, socio-cultural dynamics. In this context, the front and back structure of the work is determined in four basic stages.

While Boydaş defines the definition as making a complete list of all visual and sensory objects that can be seen in the work, that is, as an inventory process, he says that it is related to the organization of art/design elements according to the principles of artistic arrangement during the resolution phase. At the same time, it is essential to look at the organization of elements such as line-dot effect, color, texture, stain, valor, light, shape, form (form) in the dissolution stage according to principles such as balance, emphasis, rhythm, repetition, harmony, contrast, ratio-proportion, and space. mentions (Boydaş, 2007, p. 43–44).

The four-based art criticism method consisting of definition, analysis, interpretation and judgment; The preliminary structure analysis of the work has been deciphered in accordance with the identification and analysis steps.

The results obtained from the 3D modeling were compared with the front structure elements of the original work, and the spatial comparison of the picture, which took place in the real space, was made. In this way, how much the fictional space overlaps with the reality, what kind of perspective the artist uses and the possible point of view are also discussed.

The Relationship between Painting Art and Technology

By the end of the 18th century, the progress in the field of technology and science also showed its effect on the art of painting. It is seen that the art of painting, which is under the influence of technology in terms of technique and knowledge, has undergone emotional and intellectual changes. Technology has also led to the emergence of a number of technical variations on the picture (Öznülüer, 2014, p. 46).

In response to this change and technical diversity, the artists used technological devices as a tool in the production process and transformed this advantage into an effort to seek new forms through traditional art. For example, the ability to reveal images, forms and their various variations that are very hard or not possible to do manually, to interpret the dimensions of the sculptures modelled through 3D programs as desired, to change the material of the material in as little as a second, to reveal the artifacts in seconds. These are the first things that can be said to be delivered to many people living in the world by the help of internet (Tanyıldızı, 2008, p. 8–9).

The biggest development that has an effect on the art of painting can be shown as the use of digital images in a well-rounded of areas via computers and the internet. It is quite natural for art to find a new definition for itself in this process, because it is an undeniable fact that art always seeks new methods and tools at the stage of constructing a new language and reality (Özkaplan, 2009, p. 20).

Societies continue their lives in a world dominated by the "digital image and visual culture" created by the improvement of technology in the 21st century. Art, which uses perception as food in every aspect of daily life, changes and expresses itself in new ways. People can learn this new way of expression only with the desire to understand and solve this boundless confusion (Avcı, 2013, p. 23).

Producing images with the help of technology, which is contrary to the basic principle of modern art, creating a mechanical copy of nature and being able to be reproduced can be seen as the reason for this contradiction. The artist, whose technical way of thinking and seeing has changed, used to convey his thoughts using canvas and paint, but now he reveals the images he will create through technological products (Zeytin, 2008, p. 16).

Technology, art and human connection are very effective in the production process of art. Changing art through updated technology has contributed to the development of production with the help of different techniques. Therefore, the existence of technology has been accepted as an experiment as well as a reflection of nature in art. It has been observed that the works that cannot be produced in the absence of technology are produced more easily by means of computers. Now the virtual world has taken the place of reality, has begun to come to the fore in the art world, and has put pressure on the necessity of reorganizing art history in a way that includes the concept of "digital art" (Sağlamtimur Özel, 2010, p. 216).

3D Modeling

Computers do not consist of only the parts and operating systems that make up the computer. It also includes various software that allows the realization of the work that we can do through the computer. One of these software is 3D software used by architects, interior designers, engineers and graphic professionals dealing with computer graphics.

"To be able to model the form of a living or non-living being in three dimensions can be done by means of various computer software. The resulting product is called a 3D model. Models can also be viewed as 2D images on the computer. The designed 3D model can also be converted into a real physical object using 3D printing technology via 3D printers. In short, it means having 3D depth" (Taşkesen, 2017, p. 62).

Polat, 3D modeling; described it as a type of visual creation that has the desire to add depth to the object by using the real size in an area that does not actually exist (Polat, 2019, p. 4). Ocvirk, on the other hand, states that the only feature that distinguishes the 3D modeling technique from the 2D visual creation technique is to have 360-degree control over the objects in the design process and states that "In two-dimensional graphic arts, images usually exist in two dimensions, but they can create an illusion spatially" (Ocvirk et al., 2015, p. 32). According to Gürer, "The main purpose of three-dimensional design studies is to prepare to give new visuals and new messages by using visual memory and similarities effectively" (Gürer, 1992, p. 27).

Human is an entity that can perceive objects in three dimensions with the help of light and shadow, and can convey the objects he has drawn on the surface as if they are three-dimensional with the help of light and shadow. However, although the objects transferred to a two-dimensional surface seem to be three-dimensional, it is impossible to walk around these objects, to look under or above them, and to turn them to the right or left. However, by using 3D software, it becomes possible to look at an object 3D modeled in the software from any angle or to rotate 360 degrees around it.

The first known 3D human model in history was created by William Alan Fetter using the wireframe method. Fetter defined this figure, known as the "first human" (Image 1), as the "Human Figurine" (Franke, 1986, p. 103).
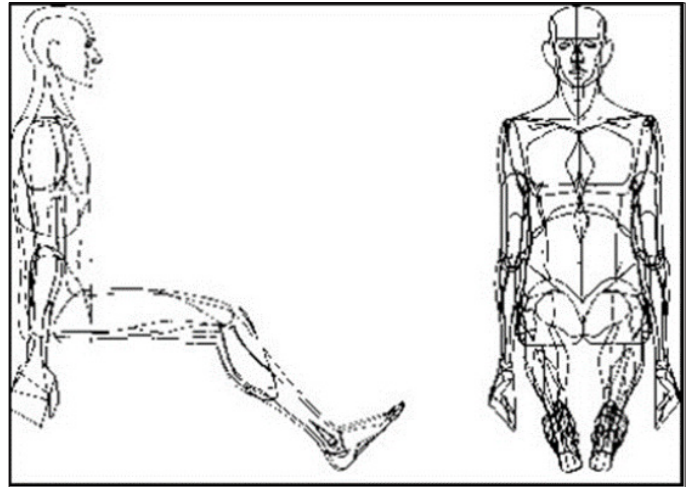
Image 1.
First Human (Fetter, 1964)
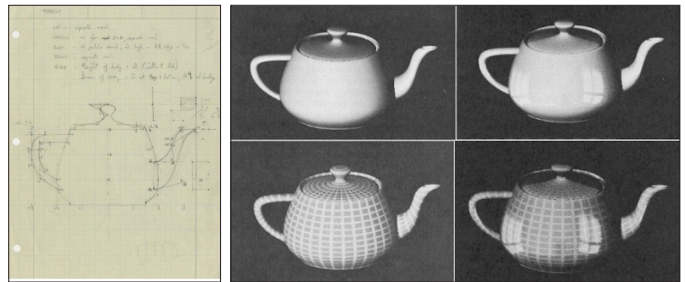
Image 2.
Utah Teaport (Newell's, 197)

Cannon Evans and Ivan Edward Sutherland, who laid the foundation of computer graphics used today and were trainers of some computer companies at that time, may not be aware that they are raising a pioneer named Martin Newel. While aiming to create a form with an amorphous but measurable structure in order to test the 3D scenes, which are quite simple today but quite complex at that time, Newel determined a melitta-type teapot as a reference for himself. He managed to create a geometry just by modifying its main form and discovered the Utah Teapot (Image 2), which is now used as a reference in 3D computer graphics.

At the end of the 1970s, an algorithm was discovered in which the front surfaces could be seen without seeing the back surfaces on the computer screen, and it was named the Newel algorithm. As a result, users were able to create 3D models with surfaces, rather than lines and mathematical data, which now allow them to see only wireframes in their viewports.

3D modeling can generally be defined as two groups as architectural and organic modeling. In architectural modeling, solid or solid modeling, that is, more angular and rigid models, can be created, while in organic modeling, objects with any texture or structure that exist in the world can be modeled.

Opportunities of Digital Technology

The art form, which is created as a result of the use of digital technology and which has the feature of being virtual, meets aesthetic values is defined as "Digital Art" (Çokokumuş, 2012, p. 53).

Graphics, on the other hand, is digital art; It is described as the use of graphic programs or special software as a new tool in art

Image 3.
Franke "Bitwa pod Grunwaldem" Render Reconstruction (Herbert W. F, 1878).

Image 4.
Bursa Green Mosque Floor Plans

expression and its reflection on the production of the image revealed on the screen with the technical language formed by the numbers mathematically (Çizgen, 2007, p. 69).

The use of computer technology offers several benefits in making the design more functional. It provides more effective and faster designs. It is important in the realization of texture, perspective, color, shape, animation and volumes that are difficult to perform manually. Thus, computers, which offer new possibilities during the creation of the work, enable the user to reach their purpose faster (Bölükoğlu İz, 2002, p. 255).

With digital art, the work itself can be reproduced on digital media using technology, while works created with traditional methods are also exhibited with the help of a technological tool, and they have the chance to reach a much larger audience (Ersöz Karakulakoğlu, Selva Askeroğlu, 2018, p. 412).

If we give an example of a work done in this regard, the digitally prepared 3D reconstruction of the Polish artist Jana Matejko's Grunwald War / Bitwa pod Grunwaldem, exhibited in the Warsaw National Museum, stands out as an important work (Soydan, 2020, p. 40).

Çıracıoğlu stated in his research that digital arts can be handled in a way that covers many different disciplines (Çıracıoğlu & Salderay, 2021).

Findings and Interpretation
Within the scope of the study, 3D modeling of Osman Hamdi Bey's "The Tortoise Trainer" was made, and the preliminary structural elements of art criticism were analyzed and the analyzes obtained were revealed.

Osman Hamdi Bey is an artist who is known for his different personal characteristics and has made great contributions to the fields of archeology and museology in our country. It is known that Osman Hamdi, the eldest son of Edhem Pasha, was born on December 30, 1842 (Demir, 2020, p. 33).

He is known as the first painter to use figures painted in large sizes in Turkish painting art. Even though there were figures who used figures among his contemporaries, they remained in the background in the places or compositions in which they were used. In the works of Osman Hamdi Bey, on the contrary, more self-confident figures are seen (Demirsar, 1987, p. 33).

While the artist used photography for the spaces, like other artists of his period, he used live models for his portraits. He drew
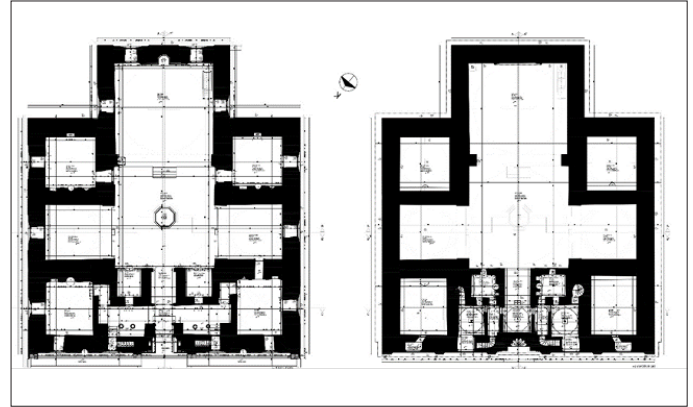
Image 5.
Two Different Versions of the Tortoise Trainer (1906 Version on the Left, 1907 Version on the Right)

the photograph he had taken in a random environment on the canvas surface with the collage technique (Demir, 2020, p. 9).

Although the work is known as "The Tortoise Trainer" in Turkey and abroad, it is known as "L'Homme Aux Tortues", that is, "Man with the Tortoise" in France (Eldem, 2009, p. 21). This work is considered one of the most important works of the artist. It is known that the artist used the Hünkar Mahfili on the floor just above the Yeşil Mosque entrance for the work, which has two versions, which are known to have some differences (Demir, 2020, p. 22). When the architectural plan of the mosque is examined, it is seen that the building consists of two floors (Image 4).

Artifact Analysis
The first layer of the work is the paint in the visible state of the painting and the fabric that forms the canvas.

When we look at the second layer, we see the space in which the painting takes place in the front structure, the object and the light in the space. It is known that Osman Hamdi Bey has different works in many places. However, there are some places that he uses more than once in his works, and the first of these plac-

Image 6.
Hünkar Mahfili Window Inside View

Image 7.
Hünkar Mahfili Window Exterior View, Green Mosque Door, Bursa C.J. Fettel Photograph 1870.

es is the Yeşil Mosque in Bursa. The Tortoise Trainer, which has two different versions that he transferred to the canvas in 1906 and 1907, which is related to the work, is also in the Yeşil Mosque (Demir, 2020, p. 22). When the two works are compared, visible differences are observed (Image 5).

An old male character appears before us with his yellow turban, ney in his hand, nakkari hanging on his back, and turtles around the figure, seen right in front of the window of the Hünkar Mahfili. The most basic difference that can be seen at first glance is the windows. While the tile piece under the window arch was not found in the first version, it was added to the picture in the later version. In addition, the vase seen in the window space in the later version and the painting "Muhammad" that we can see in the upper right part of the wall are not seen in the first version. While there are five turtle figures in the first version, there are six turtles in the other version.

Although the window joinery seen in the work has been changed to plaster ornaments today (Image 6), it is seen that the wooden window was in place before the restoration in the old photographs of the building (Image 7).

Since no difference was observed between the tile panels seen in the photograph taken inside the space and the panels processed

in the work, it is obvious that the tile panels were not added later by the artist. Considering the plan of the mosque, it is observed that while the façade facing the window is located in the north, the light seen on the right wall of the window on the figure was added with the interpretation of the artist.

The movement of the object in the space is the male figure in the space and the turtles lined up around it. The old figure standing in front of the window, leaning forward in a red robe, is looking at the turtles.

In the first painting by Osman Hamdi Bey in 1906, there are turtles eating vegetables and an old man dressed in red oriental clothes that looks like a dervish. It is clearly seen in the photographs taken in 1873 in Ottoman Sheathing style (Dress-i Osmaniyye, 1873) that the turban on the head of the dervish was used instead of a dervish turban, using a traditional headdress peculiar to the 19th century (Image 8) (Eldem, 2019).

Eldem states that the education that the artist wants to give to his students here is actually a reflection of his reaction against his students not hearing him and not understanding what he is saying. He also mentions that the movement exhibited by the figure has comments that "Osman Hamdi wants to point out that in this painting, just like it takes time to educate turtles, it will take time for Turkish people to be educated and civilized" (Eldem, 2009, p. 25–26).

Image 8.
Osman Hamdi Bey in his Oriental outfit in Vienna, 1873. Edhem Eldem collection.

Image 9.
Japanese engraving found in an article by Swiss diplomat Aimé Humbert about Japan in an issue of the French travel magazine Le Tour du Monde in 1869.

In the observed individual portrait, a single figure portrait can be examined. According to Derci, "The main point in Osman Hamdi Bey's figure formation is based on the photographs he took in a studio with different traditional clothes. These photographs also allow the artist to include himself in some of his paintings" (Derci, 2016, p. 112). Therefore, the probability that the figure appearing in the work belongs to him is quite high. The tired expression on the figure's face is clearly visible. Compared to the engraving by Aimé Humbert, it can be said that it resembles the figure on the engraving (Image 9).

The finished version of the painting, which is the ideal image, shows the painting itself. As described in the sources researched, it is thought that the main theme that Osman Hamdi Bey is trying to convey to the audience is the discomfort caused by the low success rates of the community around him, as well as the visual state of his critical attitude towards the tired and worn out state.

Hünkar Mahfili, which is the subject of the work as a place, was modeled on an architectural project using the 3D software called Sketchup and was first reconstructed in the virtual environment (Image 10-11-12).

After the 3D modeling was created, the textures (coating) of the model were defined on the surfaces with the photographs tak-
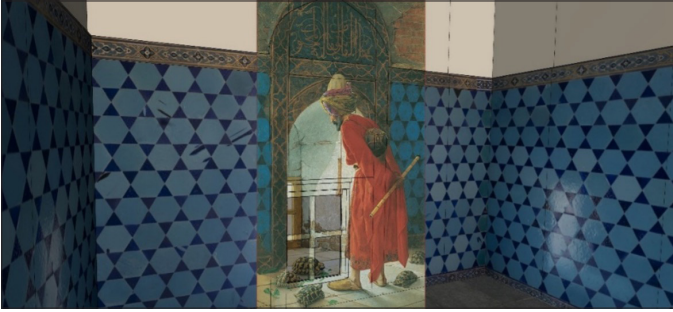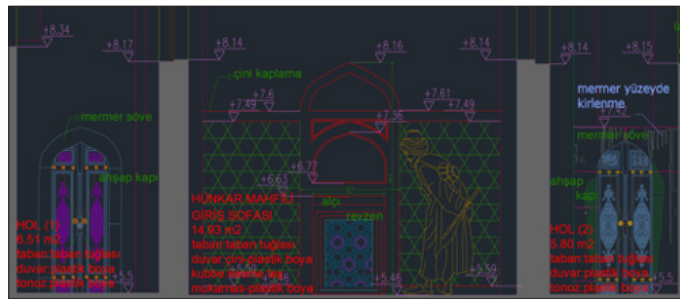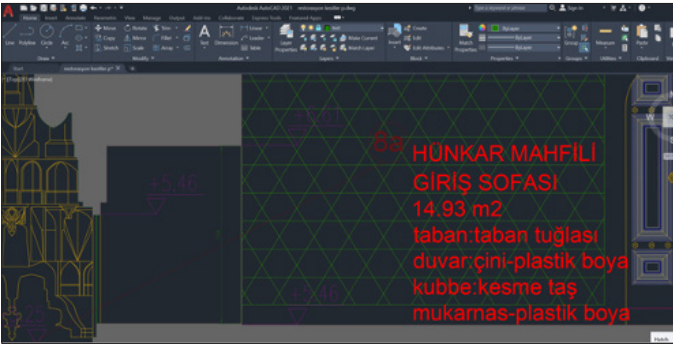

Image 10.
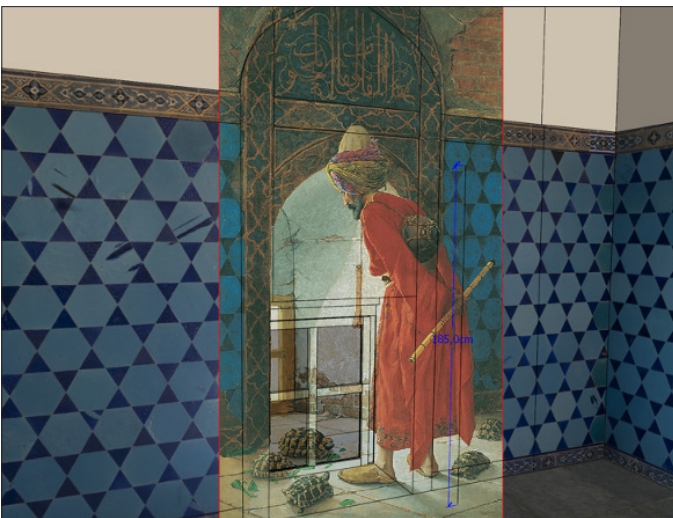*Hünkar Mahfili in 3D Model from the Artist's Eyes 3D*

Image 11.
View of Hünkar Mahfili from the Upper Layer to the Window in a 3D Model

Image 12.
Overlaying the Artifact with the 3D Model (Matchphoto)

Image 13.
Hünkar Mahfili AA/ BB Section

Image 14.
Matching Artwork and 3D Model with Mach photo Technique

en in the Hünkar Mahfili, and today's realistic appearance was obtained. After the material was defined, the camera angle was determined by using the matchphoto technique with the origi-

Image 15.
Left side section of the building

Image 16.
Render Image from 3D Model

nal work, and the visual and 360-degree panoramic image of the space was reached with the Vray rendering program.

As seen in the technical drawing of the building, the window in front of the figure is 114 cm high and 83 cm wide (Image 13).

The width of the tile borders seen on the right and left of the window is 114.13 cm, and the height of the window seen from the ground at the end of the arch is 266 cm. When the perspectives of the work and the modeled space are overlapped, it is seen that the dimensions of the work and the real window do not overlap, and the window in the work is transferred to the picture in a shorter size.

It is seen that the apparent depth of the window is drawn deeper on the work, and at the same time, the perspective escapes of the work and model floor do not match (Image 14). In addition, through this method, the estimated height of the figure in the space is also observed.

When the left side section of the building is examined, the camera placed next to the door shows the point where the artist looked at the composition that made up the work (Image 15). The distance of the camera to the window was measured as 364 cm.

The render output obtained from the angle placed at the artist's point of view actually shows the exact image that the artist has seen (Image 16).

Again, when panoramic camera is preferred from Vray render camera settings, it is possible to obtain 360 degree panoramic rendering image (Image 17).
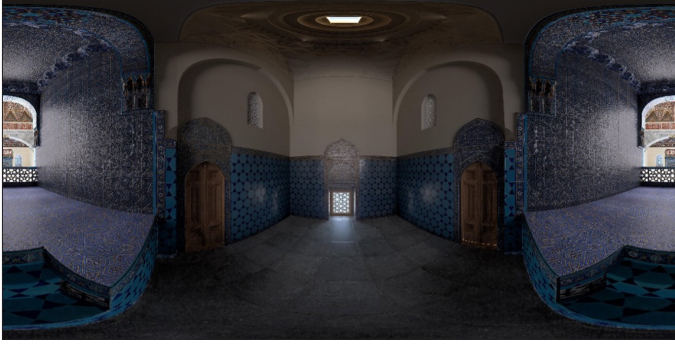
Image 17.
Hünkar Mahfili Panoramic Render Image

Conclusion

Analyzing and criticizing the determined work with an innovative perspective, using computer-aided 3D modeling software, which is the product of the technology that emerged as a result of the industrial revolution that took place in the 19th century and mid-19th century, within the scope of the research and application under the title of "Reading a work in 3D in the art of painting" carried out.

In this context, in the research; As the subject, an artist who takes place in the interior and is included in the Impressionism art movement was preferred. 3D modeling was made on the original image of the selected work, the closest materials to the materials seen in the work were defined on the modeled objects, and the renders were taken after the light and camera settings were made. At the same time, it is possible to look at the composition in which the picture passes through the eyes of the artist in 3D through VR glasses.

The greatest development in the field of plastic arts, which is thought to affect the art of painting, is known as the invention of the camera. Artists acted with the motive of conveying what they saw in every age they lived; However, the image transfer process made by the camera is much less costly and less time-consuming, which has affected many artists. It is not surprising that the person who made this great discovery had access to computer technology without delay. It is seen through the application that the use of computers can be used in the interpretation of the works of artists, as well as in the production of works of art.

Osman Hamdi Bey first took a photograph of the Hünkar Mahfili, which he chose as the venue in his work, and then transferred it to the canvas. It is known that the artist uses the squaring technique in the sketches of the works; but when the real space and the space within the work are compared, perspective differences are seen. Apart from this, although the window is on the north façade, light movement is perceived from the window as if it were in the south or west. The interior, which should be darker under normal conditions, is rendered much brighter than on the canvas surface.

Although the area that the artist looks at is a wide angle in the 3D modeled work, the artist still processed as much as he saw the area he wanted to see and limit on the canvas surface. The perspective escapes of the interior space that the work deals with, the intensity of light, the use of vivid or pale colors, and the addition of an object-figure into the space are related to what the artist has in mind.

The 360-degree render image obtained from the 3D-applied work allows the artist to look at the place and its surroundings through VR glasses, while at the same time, it makes the domes of the mosque visible along with the area where Hünkar Mahfili, which is behind the point where the artist looks at the work, which is impossible to see in the painting.

It is hoped that the study will guide future studies in terms of both analyzing multiple works in terms of method and technique and bringing different perspectives to the works. 3D artworks produced with 3D software can be used as course materials in the art education process. In the courses for the study of art, a different interpretation technique can be given to the instructors and students, and in this way, the presentations can be enriched. This richness can be integrated into art museums and offer different experiences to those who visit the museum.

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