NEW APPROACHES IN FINE ARTS:

THEORY, METHOD, AND PRACTICE

Editor: Assist.Prof. Göktuğ Ege SAĞLAM

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Editor: Assist.Prof. Göktuğ Ege SAĞLAM

Editor in chief: Berkan Balpetek
Cover and Page Design: Duvar Design
Printing: December 2025
Publisher Certificate No: 49837
ISBN: 978-625-8698-61-9

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Chapter 1

A Breaking Point of Modern Art: "Bottle Of Vieux Marc, Geblet, Guitar and Newspaper"

Ümit ÖZKANLI[1]

1. INTRODUCTION

Pablo Picasso's 1913 painting "Bottle of Vieux Marc, Goblet, Guitar, and Newspaper" represents the pinnacle of Synthetic Cubism, one of the most radical periods in 20th-century art. This period marked a break from the Analytical Cubism phase, in which artists atomized objects; the aim was no longer to fragment, but to recombine (synthesize) the basic forms of everyday objects into larger, simpler, and clearer forms, thus creating a new visual reality.

The work's immediately striking oval canvas format adds dynamic movement to the Cubist composition, which rejects traditional perspective, guiding the viewer to the center of the painting—the interplay between planes. Here, ordinary objects like the Vieux Marc bottle, goblet, guitar, and newspaper, rather than appearing fragmented, are presented as overlapping, sharp-edged geometric planes. This technique allows objects to be perceived simultaneously from multiple perspectives rather than from a single fixed point, breaking optical illusion and opening the door to an intellectual realm of perception [1-4]. Picasso, through the typographic elements and texture imitations he painted on canvas (especially in the newspaper sections), deploys the philosophy of collage technique. This not only adds a slice of reality to the work but also emphasizes the painting's two-dimensional flatness, declaring that art is not a tool of illusion but a statement about its materials. Symbols such as the guitar and the goblet in the work evoke the bohemian lifestyle and intellectual gatherings of the period, while the disrupted perception of space and sharp forms invite the viewer to question objective reality. This study aims to illuminate why and how modern art transformed by examining in depth the formal, technical, and philosophical innovations in this key work of Synthetic Cubism [2-5].

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2. SYNTHETIC CUBISM AND RECOGNITION

This 1913 work by Pablo Picasso is the artistic manifesto of the Synthetic Cubism phase. This period, unlike the preceding Analytical Cubism (the atomization and fragmentation of objects), represents a phase in which the basic geometric forms of objects are synthesized (combined) into larger and larger pieces. The work is particularly notable for its use of an oval canvas; this format breaks the traditional boundaries of a static rectangular frame, adding a dynamic dynamism to the composition. The oval structure helps focus the viewer's eye on the objects at the center of the painting while reinforcing the Cubist perception of space with a circular rhythm. The forms in the work are simplified, planar, and skillfully superimposed blocks. Thanks to this technique, the artist allows the simultaneous perception of objects from different perspectives rather than a single viewpoint, thus presenting both the side profile and the top view of a bottle simultaneously [4-6].

The ordinary objects from everyday life in the foreground, such as the Vieux Marc (cognac) bottle, the goblet, the guitar, and the newspaper, are the strongest evidence of this Synthetic Cubist approach. Rather than excessively fragmenting these objects, Picasso reduced them to geometric shapes and scattered them across the canvas using larger, sharp-edged blocks of color. This method preserved the objects' essence and recognizability. For example, the silhouette of the bottle or the outline of the guitar body are easily discernible, but their details are simplified. This simplification and reassembly create distinct layers on the painting's surface, redefining not only the individual existence of each object but also its spatial relationship to other objects. With this technique, the artist emphasizes the painting's two-dimensional flatness, distancing the viewer from the illusion and inviting them to interact with the painting itself, a surface composed of paint and form [4-7].

3. COLLAGE AND THE SURFACE OF REALITY

The most striking and revolutionary aspect of "Bottle Vieux Marc, Goblet, Guitar, and Newspaper" is its artistic expression of collage. This technique, extensively used by Picasso and Georges Braque during the Synthetic Cubism period, introduced a new layer of material and philosophy to art. Although this specific work is not a papier-mâché created by pasting real paper onto canvas, the typographic elements (letters and numbers) and realistic texture imitations painted on the canvas skillfully mimic the effect of collage. These imitations are particularly concentrated in the sections that evoke newspaper clippings. By using these typographic and textural allusions, the artist adds a layer of verisimilitude to the painting; the viewer is given the illusion of seeing a

fragment of everyday life, even though it is represented in paint on the canvas. The philosophical purpose behind this collage-like approach is to question the nature of painting. Picasso and the Cubists used newspaper and other ordinary pieces of paper (or their painted imitations) to draw attention to the inherent two-dimensional, flat surface of a painting. While traditional art aimed to immerse the viewer in the canvas through the illusion of perspective, the Cubists rejected this illusion. For them, art was less an imitation of reality than a statement about its own materials and surfaces. Collage elements (or their typographic representations), pasted or drawn onto the canvas, remind the viewer that the painting is merely paint and paper; this emphasizes the idea that art is a form of expression, not a means of illusion.

In "Bottle Vieux Marc, Goblet, Guitar, and Newspaper," Picasso uses light to emphasize the two-dimensional flatness of the painting, rather than to reveal the volume and depth of the objects. In traditional painting, light, coming from a single source, falls on the objects, creating soft shadows that give them volume (three-dimensionality). In this work, objects (guitar, goblet, bottle) are represented as planar blocks of color, divided into geometric pieces. Instead of smooth gradations, transitions of light and shadow occur abruptly between opaque or translucent planes separated by sharp lines. The light source is ambiguous and inconsistent. One part of an object may be illuminated, while another, overlapping plane next to it, may be shadowed. This inconsistent lighting completely disrupts the perception of space and depth. The viewer struggles to understand which part is in front and which is behind, as light and shadow do not follow a rational spatial logic but serve solely as compositional arrangements [1-7].

3.1. Reality and the Collage Effect

The work's interaction with light aims to mimic the effect of collage (papier collé). Picasso adds shadows with paint to the edges of the sections, evoking newspaper and paper scraps (collage materials). These painted shadows make these planes appear to rise slightly from the surface. However, this is not to create a traditional illusion of depth, but to convey the sense that the material lies on the canvas. These shadow effects created by the paint aim to break the illusion that the painting opens onto a deep void like a window. Light and shadow constantly draw the viewer's attention back to the painting's flat, two-dimensional surface [8-11]. They emphasize that art is not an imitation of reality, but a statement about its own material and structure. Consequently, in this work, light, rather than reflecting objective reality [12,13], is a deliberately

unconventional tool that serves the Cubists' primary goal of disrupting traditional perception and highlighting the canvas's surface.

3.2 The Masses and the Birth of Pop-Art

Furthermore, these ordinary objects and typographic elements reminiscent of newspaper headlines used in the work represent the first and most significant steps in art's removal from the narrow framework of high culture and its encounter with mass culture and contemporary life. A glass, a bottle, or a newspaper emerges from the studio and brings the dynamics of the street and daily consumption habits into the picture. This approach, by expanding the subject matter and materials of art, laid the foundations for the Pop-Art movement (Andy Warhol, Roy Lichtenstein) that would emerge nearly half a century later. This work is not only a Cubist masterpiece, but also a key moment in the history of modern art, when traditional boundaries of art were broken down [14-16].

4. BOHEMIAN INTELLECTUAL LIFE

Picasso's "Bottle of Vieux Marc, Goblet, Guitar, and Newspaper," while abstracted in the language of Synthetic Cubism, is actually a portrait reflecting the daily life and cultural atmosphere of the artist and the intellectual circles of the period. The central objects in the work—the guitar and the goblet—are powerful symbols in this context. The guitar is not only a preferred object because its form lends itself to geometric simplification, but it is also an indispensable symbol of the bohemian lifestyle, music, and social gatherings. In early 20th-century Paris, music and conversation formed the foundation of creativity in artists' gathering places. The goblet, on the other hand, represents the consumption of Vieux Marc (a strong French brandy), a staple of these social rituals, gatherings with friends, and intellectual discussions. These objects imbue the work with a human warmth and the spirit of the period, which lies behind the cold geometric order.

The most revolutionary aspect of the work is its complete subversion of the perception of space. In this canvas, where the rules of perspective that create the illusion of three dimensions in traditional art are rejected, objects are represented on a flat, depthless surface. Instead of being positioned in space, the bottle, goblet, and guitar are depicted as intersecting and overlapping planes. This forms the basis of the Cubist concept of space: objects are shown to the viewer from multiple angles simultaneously. However, this sharp separation and overlapping creates a curious optical situation: parts of the objects appear transparent, as if revealing the background or other objects, while a plane

immediately adjacent to the same object remains opaque. This technique constantly challenges perception, forcing the viewer to move back and forth across the painting's surface, emphasizing that space is no longer a physical void but an intellectual construct [15-17].

As a result, "Bottle Vieux Marc, Goblet, Guitar, and Newspaper" is not just a still life but also an intellectual challenge. Relentlessly rejecting traditional rules of perspective, the work transforms the viewer from passive observer to invite them to reorganize their perceptions and question objective reality itself. By dismantling and reconstructing objects, Picasso explores the distinction between appearance and essence. This visual and philosophical richness makes the work one of the most important milestones in the evolution of Cubism, as it is a visually and intellectually rich Cubist masterpiece that proves that art is not only about what is seen but also about what is known. Figure 1 shows Bottle of Vieux Marc, Glass, Guitar and Newspaper, Pablo Picasso, 1913.

Figure 1. Bottle of Vieux Marc, Glass, Guitar and Newspaper, Pablo Picasso, 1913

5. DISCUSSION AND CONCLUSIONS

"Bottle Vieux Marc, Goblet, Guitar, and Newspaper" is one of the most significant turning points in modern art, sealing Pablo Picasso's mastery during his Synthetic Cubism phase. More than just a still life, this work symbolizes the rejection of traditional perspective and the construction of a new perception of

reality. Picasso used the oval canvas format to add dynamism to the composition, and rather than fragmenting objects, he synthesized them into large, planar, overlapping geometric blocks. This technique allowed the viewer to view an object not from a single fixed point, but from multiple angles simultaneously.

The work's enduring legacy lies in its application of collage philosophy to the canvas. Typographic elements and everyday objects imitated by paint brought art into mass culture, laying the foundations for Pop Art. At the same time, by emphasizing the two-dimensional flatness of painting, it declared that art was not a medium of illusion but a statement about its materials. This masterpiece, capturing the spirit of the era's bohemian life through symbols such as the guitar and the goblet, subverts traditional rules and invites the viewer to constantly question their visual perception. Ultimately, "Bottle Vieux Marc, Goblet, Guitar, and Newspaper" is a timeless milestone with its intellectual depth, radically altering the concepts of surface, form, space, and reality in modern art.

REFERENCES

1. Cubism. Metropolitan Museum of Art.
2. Tudor History of Painting in 1000 Color Reproductions. Robert Maillard, Editor.
3. The Story of Painting. Sister Wendy Beckett and Patricia Wright.
4. Rewald, Sabine. “Cubism.” In Heilbrunn Timeline of Art History. New York: The Metropolitan Museum of Art, 2000
5. Gris, Juan. "Portrait of Pablo Picasso". The Art Institute of Chicago. Retrieved 2021-06-07.
6. Pablo Picasso, 1909–10, Head of a Woman, bronze, published in Umělecký Měsíčník, 1913 Archived 2014-03-03 at the Wayback Machine, Blue Mountain Project, Princeton University
7. William H. Robinson, Jordi Falgàs, Carmen Belen Lord, Barcelona and Modernity: Picasso, Gaudí, Miró, Dalí, Cleveland Museum of Art, Metropolitan Museum of Art (New York), Yale University Press, 2006, ISBN 0300121067
8. Ç. Cengiz, “Relationship of Braking Distance and Rear Headlight on Highways,” Light and Engineering, vol. 32, no. 2, pp. 29–36, Apr. 2024.
9. Efe, S.B., Varhan, D. 2020. Interior Lighting af a Historical Building By Using Led Luminaires: A Case Study Of Fatih Paşa Mosque, Light & Engineering 28(4), 77–83.
10. M.S. Cengiz, “Human Centered Architectural Illumination Design in Prisons”, Light & Engineering, Vol. 30, 2, pp. 46–54, 2022
11. Tuna, B., Efe, S. B. (2023). Yol aydınlatması için FV Beslemeli Akıllı LED Armatür Tasarımı. Rahva Journal of Technical and Social Studies, 3(1), 73-81.
12. M. S. Cengiz, “Role of Functional Illumınation Urban Beautification: Qatar-Doha Road Illumınation Case”, Light & Engineering, Vol. 30,3, pp. 34-42, 2022.
13. Ç. Cengiz and H. Aydoğdu, “GAMMA Renewal Function in Censored Data”, Bitlis Eren University Journal of Science and Technology, vol. 5, no. 2, 2015, doi: 10.17678/beujst.09962.
14. Art in Time: A World History of Styles and Movements. Phaidon.
15. Rubin, William, Pablo Picasso, Georges Braque, and Museum of Modern Art (1989). Picasso and Braque: Pioneering Cubism. New York, Boston: Museum of Modern Art. p. 36. ISBN 9780870706752

16. Rubin, William, Pablo Picasso, Georges Braque, and Museum of Modern Art (1989). Picasso and Braque: Pioneering Cubism. New York, Boston: Museum of Modern Art. p. 30. ISBN 9780870706752
17. Cubism: A New Vision. Ninón Rodríguez, Miami Dade College.

Chapter 2

The Ontological, Aesthetic, and Historical Evolution of Ceramic Art

Bedriye GÖZGÖR[1], Tahsin BOZDAĞ[2]

Introduction

Ceramics as an Ancient Material Between Art and Craft

Ceramics, one of the oldest materials in human history, has carried a dual identity since the dawn of civilization—serving both as an indispensable part of daily life and as a sophisticated medium of aesthetic expression. This dual nature elevates it beyond a mere utilitarian object, transforming it into a mirror that reflects the technological, cultural, and artistic accumulation of the societies in which it was produced (Fındık, 2017). The multilayered story of fired clay presents one of the most concrete narratives of the dialectic between art and craft, function and form, intention and coincidence.

Philosophy of art asserts that artworks possess a radical diversity that cannot be reduced to a single ontological category (Howell, 2002). This philosophical framework provides an essential key to understanding the astonishing journey of ceramics—from its humble and functional beginnings in the Neolithic Age, to its transformation into a symbol of prestige within palace workshops, and finally to its presence as a conceptual object in contemporary art galleries. Clay has demonstrated ontological flexibility, adopting a different identity in every age and civilization.

This article, focusing on the ontological flexibility of ceramics, will examine its historical evolution, objective criteria of value, cultural modes of expression, and its search for identity in the modern period by integrating perspectives from aesthetic philosophy and art history. The historical transformation of this ontological structure forms the first act of the philosophical narrative of ceramics.

1. The Ontological Flexibility of Ceramics: From Functional Vessel to Conceptual Object

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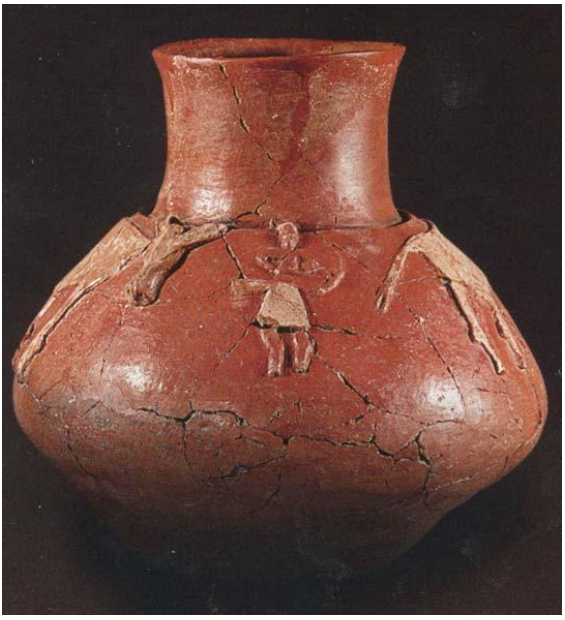
This section examines the changing ontological status of ceramics throughout history and the significance of this transformation from the perspective of the philosophy of art. The idea that the concept of art does not possess a classical structure defined by necessary and sufficient conditions, but instead exhibits a radial structure organized around prototypes (Dean, 2003), provides a productive foundation for understanding the various historical roles of ceramics. Ceramics has existed across a wide spectrum within this radial structure—from the functional vessel at its center to the conceptual installation at its periphery.



Görsel.1.Çatalhöyük (Arkonevs,2025)

Ceramics' ontological evolution can be analyzed in three fundamental stages:

Functional Origins: The known history of ceramics parallels humanity's transition to settled life around 8000 BCE. The earliest clay vessels produced during this period served as "packaging forms" used to store and preserve goods (Erdal & Gücüyener, 2025). The primary purpose of these earliest examples from the Pottery Neolithic Age was not aesthetic concern but the fulfillment of practical needs in daily life (Fındık, 2017). This ontological beginning encoded functionality into the very DNA of ceramics.

Cultural Attainment of Status: Over time, ceramics transcended its purely functional role and transformed into a symbol of cultural status. In the Ottoman Empire, ceramics were initially viewed as an auxiliary art (kaşî) that adorned architecture, yet with the development of vessel production (evanî) under palace

patronage, they gained the identity of a high-status cultural object (Fındık, 2017). This transformation shows a striking parallel to the evolution of the Ebru art form, which, like ceramics, shed its auxiliary role to calligraphy and illumination and eventually evolved into an independent art form. Both art forms experienced an ontological leap shaped by cultural practices and artistic sensibilities.

Transformation into an Autonomous Art Object: In 20th-century Turkey, ceramics declared its autonomy through an artistic revolution. Füreya Koral's adoption of ceramics as a studio practice distinguished it from traditional craft and industrial production, granting it the identity of an "independent art discipline." Artists such as Sadi Diren, who regarded ceramics as a sculptural material, and the widespread emergence of sculptural and conceptual forms from the 1980s onward, further solidified this ontological rupture (Yılmaz, 2019).

This historical trajectory affirms a fundamental principle of aesthetic philosophy: In principle, there is no object that cannot become a work of art. The ontological status of art forms is determined by the beliefs and practices of their practitioners; rather than a mind-independent reality waiting to be discovered, it is these very practices that constitute the reality itself (Thomasson, 2005). The ontological diversity of ceramics—from vessel to sculpture, from wall surface to installation—inevitably brings forth the question of the criteria by which its aesthetic value is determined.

2. Objective Value and Mastery in Ceramic Traditions

Contrary to the common belief that artistic value is entirely subjective, the value of ceramics rests—at least in part—on objective and measurable criteria. The Aristotelian model of virtue or excellence, proposed within aesthetic philosophy, offers a strong framework for understanding this objective value. According to this model, the value of an object depends on how well it fulfills its distinctive function or purpose (telos) (Kaufman, 2002). Throughout the history of ceramics, technical innovations and mastery have been direct reflections of the pursuit of this telos.

Technical mastery across different civilizations has revealed the objective value of ceramic works in the following ways:

Technical Innovation and Criteria of Mastery	Civilization and Its Influence
Fritted (Silica-Enriched) Clay Technology	Seljuk and Ottoman: The development of this technology aimed to produce harder, whiter, and porcelain-like forms—an effort directly tied to fulfilling its intended telos. The success of the works produced through this technique is therefore not merely a matter of subjective taste; rather, it reflects an objective fact concerning how fully the material's potential was realized in achieving a specific aesthetic goal (Fındık, 2017).
Luster Technique	Islamic Civilization (Ilkhanids): The luster technique developed in centers such as Kashan aimed to impart a metallic sheen to ceramic surfaces. Mastery of this technique elevated the object from an ordinary vessel to a valuable work of art. Its transmission to Europe through Spain, where it influenced Majolica ceramics, demonstrates that this mastery possessed a universal artistic value (Fındık, 2017).
Porcelain Production	China and Europe: Jingdezhen porcelains established a global standard of quality through characteristics such as fineness, durability, and translucency. The efforts of European factories such as Meissen to uncover this secret and develop their own distinctive traditions can be understood as an objective pursuit of a particular ideal of excellence (Yılmaz, 2019; Liu, 2024).
Technical Quality Criteria	Contemporary Mastery: Just as a successful ceramik artwork is evaluated against objective criteria such as "paint not running and colors remaining distinct" a successful ceramic work is judged by comparable standards. The criteria conveyed through Bahtiyar Hıra's works—"clean, clear, homogeneous, proportionate, and aesthetically pleasing"—demonstrate that the value of a ceramic piece is not arbitrary but grounded in specific technical and aesthetic norms (Gülaçtı, 2012).

In conclusion, artistic value is largely a function of how successfully a work fulfills the stylistic and representational purposes that express the cultural interests of the civilization to which it belongs (Kaufman, 2002). These objective criteria of mastery and value also provide the foundation for ceramics to serve as a platform through which cultural meanings are conveyed and the cognitive capacities of the viewer are engaged.

Görsel.2.Sitilistik Formlar (Clayworks, 2025)

3. Cultural Expression and Cognitive Reception

Ceramics is not merely a technical object; it is also a silent document carrying the cultural codes of the society in which it was produced and a dynamic instrument that activates the cognitive and perceptual capacities of the viewer. Its form and meaning are closely tied to its context, giving rise to its "cultural indexicality."

The cultural and cognitive role of ceramics can be analyzed through several examples:

Ceramics as Archaeological Evidence: Ceramic artifacts provide invaluable evidence for identifying the cultural layers and identities of past societies. Excavations in the Valley of Mexico have revealed layers from the Archaic, Toltec, and Aztec periods, each distinguishable by its distinctive ceramic styles (incised, stamped, or black-painted designs) (Haeberlin, 1919). These styles were not merely decorative choices but declarations of cultural identity.

Commercial and Cultural Interaction: Ceramic objects carry tangible traces of inter-civilizational interaction. For instance, luxury imported ceramics such as Italian Sigillata found at the ancient city of Syedra demonstrate the city's connections to trade networks extending across the western Mediterranean. Similarly, the influence of Chinese porcelain is evident in the forms and patterns of Iznik tiles, the pinnacle of classical Ottoman ceramics, reflecting global aesthetic dialogues (Fındık, 2017).

Cultural Symbolism: Ceramics can convey deep cultural meanings through the motifs they bear. Just as the Elibelinde/Umay Ana motif in Turkish Ebru art symbolizes fertility and protection, contemporary ceramic artists like Bingül

Başarır create works referencing Hittite art, transmitting the cultural memory of Anatolia to the present day (Güven, 2015).

The theory that art succeeds by "exploiting" the cognitive and perceptual capacities humans have inherited evolutionarily (Carroll, 2004) provides a powerful tool for explaining the impact of ceramic art on the viewer. The tactile qualities of a ceramic object, the balance of its form, and the smoothness or gloss of its glaze directly engage deeply rooted perceptual systems such as proprioception.

At this point, the thesis of the inseparability of form and content (Thomson, 2005) illuminates the cognitive value of ceramics. The aesthetic experience offered by a ceramic object cannot be captured from a photograph or summary. The weight of the material, the texture of the surface, the relationship between form and void, and the marks left by technique create a holistic experience that can provide viewers with a new perspective on the world and enhance their perceptual capacities. In the modern era, however, the identity of ceramics has become more complex, as the artist's intention is layered onto these cognitive and cultural dimensions.

4. Modern Identity Crisis: Art, Craft, and Intention

The 20th century represents a period in Turkish ceramic art that centered on one of its most fundamental issues: the tension between art and craft and the struggle for the artistic status of ceramics. This search for identity can be illuminated through the concept of "categorical intention," as articulated in aesthetic philosophy by Jerrold Levinson: the artist's desire for their work to be recognized within a particular category (e.g., as a "work of art") plays a regulatory role in how the work is interpreted.

The identity quest of modern Turkish ceramics can be understood through the following sequence of arguments:

The Status Issue: The greatest obstacle facing modern ceramics was its inability to shed strong "domestic associations," which led to its exclusion from the modern art narrative. As Füreya Koral attested, ceramic works struggled to be exhibited in art galleries, spaces largely reserved for painters. This situation indicated that ceramics had not yet been fully recognized within the category of "artwork."

The Rise of Artistic Intention: In response to this exclusion, ceramic artists sought to demonstrate that their works occupied "three-dimensional artistic space in their own right." Artists such as Attila Galatalı described ceramics as "the most abstract of the arts," effectively asserting a strong categorical

intention: that their works be perceived not as functional objects, but as autonomous art forms (Liu, 2024).

Formal and Conceptual Explorations: This intention was substantiated through concrete works. The rise of architectural wall panels in the 1960s moved ceramics from domestic spaces into public and monumental arenas. Figurative and sculptural works by artists like Candeğer Furtun in the 1980s, and conceptual installations by artists such as Zehra Çobanlı in the 1990s, represented a conscious break from ceramics' traditional functional identity and served as tangible evidence of artistic intention.

Return to and Affirmation of Craft: In the 1990s, the identity discourse took an unexpected turn. Exemplified by Alev Ebüzziya's internationally acclaimed flawless vessels, the notion of the "ceramic vessel" and craftsmanship was reaffirmed. This development signaled the emergence of a dialectical and richer understanding of identity, one that questioned the strict division between art and craft.

The complex identity quest of modern ceramics continues to evolve, gaining new dimensions through contemporary technological and ecological dialogues.

Görsel.3.Sitilistik Formlar (Clayworks, 2025)

5. Contemporary Dialogues: Technology, Ecology, and Ritual

Today, ceramics transcends its traditional boundaries, engaging in a dynamic dialogue with contemporary issues such as technology, environmental awareness, and individual experience. Clay is no longer merely a shaped material; it has become a platform where global discussions take place.

Technological Horizons: Digital technologies are reshaping the processes of creation and dissemination in ceramics. With capabilities such as artificial intelligence, image recognition, and material prediction, digital tools have

become instruments that foster innovative thinking in ceramic art and design (He, 2022). At the same time, digital platforms allow longstanding traditions, such as Chinese ceramic art, to be showcased globally and reach new audiences (Liu, 2024).

Ecological Communication: In light of Niklas Luhmann's theory, ceramic art creates an "ecological communication" loop between society and the environment through its production and dissemination processes (Keetal, 2025). Through their works, artists draw attention to sustainability, the use of natural resources, and ecological crises, positioning ceramics not only as aesthetic objects but also as instruments for social awareness (Fındık, 2017).

Ritual and Therapeutic Dimension: The practice of traditional arts carries deep meaning and healing potential for the modern individual. The creation of Ebru, as a means of "self-discipline," requiring patience and serving as a "cathartic" space in Existential Psychotherapy sessions, exemplifies this potential. Similarly, the process of ceramic creation—which involves touching and shaping clay—embodies a ritualistic and therapeutic dimension. The artist's direct and meditative engagement with the material offers an opportunity for individuals to rediscover themselves and nature in an increasingly digitalized world. In both traditional arts, the master-apprentice relationship plays a central role in the transmission of knowledge and ethics, reinforcing this dynamic (Yılmaz, 2019).

Through these new dialogues, contemporary ceramics both honors its millennia-old historical heritage and continuously reconstructs its potential for the future.

Conclusion

The transformation of clay from past to future and the historical journey of ceramic art constitute a rich narrative reflecting the essence of human civilization. What began in the Neolithic Age as a simple utilitarian vessel has, across civilizations, reached the pinnacles of technological mastery and artistic expression, and with modernism, has evolved into a medium of individual expression and a symbol of identity. Clay, continually reshaped by human hands, has assumed both functional and aesthetic identities.

The cultural significance of ceramics arises both from its role as a tangible archaeological source of the past and as a dynamic reflection of the aesthetic tastes and cultural identity of the society to which it belongs. It is an art form born from clay, shaped by fire, and resilient through time, carrying the collective memory of humanity.

Today, contemporary phenomena such as digital technology (a new functionality) and ecological communication (a new cultural expression) emerge as 21st-century manifestations of the dual nature of ceramics—functionality and aesthetics—that it has carried throughout history. Ceramics, uniting the legacy of the past with the vision of the future, continues to occupy the intersection of material, technology, and social awareness. The endless transformation of clay remains, without doubt, one of the most enduring witnesses to human creativity.

References

Carroll, N. (2004). Art and human nature. *The Journal of Aesthetics and Art Criticism, 62*(2), 95–107.

Dean, J. T. (2003). The nature of concepts and the definition of art. *The Journal of Aesthetics and Art Criticism, 61*(1), 29–35.

Erdal, G., & Gücüyener, İ. (2025). Sector not named in the packaging: Packaging protection products. *International Journal of Humanities and Art Researches, 10*(3), 257-266.

Fındık, N. (2017). *Klasik Osmanlı dönemi seramik kap formlarının tipolojik analizi* [Doktora Tezi, Selçuk Üniversitesi].

Gülaçtı, S. (2012). *Bahtiyar Hıra'nın Ebru sanatına ve eğitimine katkısı* [Yüksek Lisans Tezi, Gazi Üniversitesi Eğitim Bilimleri Enstitüsü].

Haeberlin, H. K. (1919). The types of ceramic art in the Valley of Mexico. *American Anthropologist, 21*(1), 61–70.

He, Y. (2022). Research on innovative thinking of ceramic art design based on artificial intelligence. *Mobile Information Systems, 2022*, Article 3381042.

Howell, R. (2002). Ontology and the nature of the literary work. *The Journal of Aesthetics and Art Criticism, 60*(1), 67–79.

Kaufman, D. A. (2002). Normative criticism and the objective value of artworks. *The Journal of Aesthetics and Art Criticism, 60*(2), 151–166.

Ke, Y., Phanlukthao, P., & Sirisuk, M. (2025). A systematic literature review of ecological communication of ceramic art. *Cogent Arts & Humanities, 12*(1), 2576552.

Liu, Y. (2024). The beauty of clay: A study of aesthetic pleasure as an aesthetic medium in Chinese ceramic art education. *Comunicar, 32*(78), 67-81.

Noyan Güven, İ. M. V. (2015). *Türk Ebru Sanatında Çağdaş Bir Tasarım Öğesi Olarak Elibelinde Motifi* [Sanatta Yeterlik Tezi, Akdeniz Üniversitesi Güzel Sanatlar Enstitüsü].

Thomasson, A. L. (2005). The ontology of art and knowledge in aesthetics. *The Journal of Aesthetics and Art Criticism, 63*(3), 221–229.

Thomson-Jones, K. J. M. (2005). Inseparable insight: Reconciling cognitivism and formalism in aesthetics. *The Journal of Aesthetics and Art Criticism, 63*(4), 375–384.

Yılmaz, E. (2019). *Modern / contemporary ceramic art: The story of ceramics in Turkey* [Doktora Tezi, Hacettepe Üniversitesi].

Chapter 3

Towards A Neuro-Responsive Aesthetic: Future Directions in Fine Arts

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1. INTRODUCTION

Contemporary fine arts have increasingly moved beyond object-centered conceptions of aesthetics toward practices that foreground experience, process, and perception. In this shift, artistic meaning is no longer produced solely through fixed forms or representational strategies but emerges through dynamic relationships between artworks, viewers, and the conditions of sensory and cognitive engagement. This transformation reflects broader changes in how aesthetic experience is understood within contemporary artistic discourse.

Developments in digital and interactive technologies have been central to this reorientation. Interactive systems, data-driven artworks, and immersive environments have expanded the role of the viewer from that of a passive observer to an active participant. In many contemporary practices, aesthetic experience unfolds through interaction, responsiveness, and temporal variation, emphasizing embodiment, attention, and affect as integral components of artistic engagement.

Within this evolving landscape, neuroscientific perspectives have contributed to new ways of thinking about aesthetic experience by drawing attention to the neural and cognitive dimensions of perception. While neuroaesthetics has traditionally focused on examining the neural correlates of aesthetic response, recent artistic practices suggest a growing interest in integrating neural processes more directly into the conditions of artistic experience. Rather than serving solely as objects of analysis, neural and affective states increasingly intersect with artistic systems and modes of interaction.

In this context, the notion of neuro-responsive aesthetics is used in this chapter as a descriptive term to address a set of emerging tendencies in contemporary fine art practices. These tendencies involve artworks that respond

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to cognitive, affective, or attentional states of the viewer, enabling aesthetic experiences to unfold as reciprocal and evolving processes.

The aim of this chapter is to examine neuro-responsive aesthetics within the field of fine arts and to discuss its implications for future artistic practices. By addressing its conceptual foundations, experiential characteristics, and system-based dimensions, the chapter contributes to ongoing discussions on the intersections of art, perception, and technology, while situating neuro-responsive aesthetics as a developing orientation within contemporary fine arts.

The recent academic literature in contemporary fine arts points to a marked shift from object-centered aesthetic paradigms toward approaches that prioritize experience, process, and perception. Rather than treating artworks as stable entities to be contemplated from a distance, this body of work emphasizes aesthetic experience as a dynamic and relational process shaped by affective, sensory, and embodied engagement (Sukhanova, 2024). In this context, the so-called affective and performative turns have foregrounded the role of the viewer's bodily presence and emotional involvement, reframing aesthetic meaning as something that emerges through interaction rather than detached observation (Solik, 2023).

This transformation is particularly evident in the rise of multisensory and interactive art practices, where visual perception is intertwined with auditory, tactile, and spatial dimensions. Contemporary artworks increasingly operate as environments or situations that invite participation, thereby expanding the definition of the aesthetic object to include the viewer's perceptual and experiential contribution (García Moreno et al., 2024; Wiratno & Callula, 2024). Within such practices, interactivity functions not merely as a technical feature but as a central aesthetic condition, positioning perception itself as a constitutive element of the artwork (Yoon & Kim, 2006).

Technological developments have played a crucial role in accelerating this shift. Digital media, virtual reality, and artificial intelligence have enabled immersive and adaptive artistic environments that blur the boundaries between artwork and viewer, fostering participatory modes of engagement and reshaping the experience of space and temporality in art (Yuhan et al., 2024; Zhong & Zhang, 2025). As digital technologies render artistic spaces more fluid and responsive, traditional notions of the artwork as a fixed and autonomous object are increasingly challenged, giving way to dynamic configurations that evolve through interaction and perception (Bolat, 2025; Kaya et al., 2025).

Alongside technological factors, socio-cultural dynamics have further reinforced experience-oriented approaches in contemporary fine arts. Participatory and immersive practices are frequently mobilized to address

social, political, and existential concerns, encouraging viewers to reflect on their own positionality within shared experiential contexts (Ippolito et al., 2024). In this sense, contemporary art's turn toward experience and perception not only redefines aesthetic engagement but also calls into question established frameworks of art criticism and curation, which often struggle to accommodate artworks grounded in interaction, temporality, and embodied participation (García Moreno et al., 2024; Solik, 2023).

Neuroaesthetics has increasingly engaged with questions of how perception, emotion, and embodiment shape aesthetic experience in contemporary art and digital media. Drawing on neuroscientific methods such as functional imaging and electrophysiological measurement, neuroaesthetic research has sought to identify the neural mechanisms underlying aesthetic perception, affective response, and reward processes during encounters with artworks (Di Dio & Vittorio, 2009; Vessel, 2021; Vessel & Welke, 2025) Within this body of work, aesthetic experience is commonly approached as a complex interaction between sensory processing, emotional appraisal, and cognitive interpretation.

A significant strand of neuroaesthetic research emphasizes the embodied nature of aesthetic experience, suggesting that perception is grounded in bodily simulation and sensorimotor resonance. Studies on embodied aesthetics argue that viewers engage with artworks not only visually but also through implicit bodily responses, particularly in relation to movement, gesture, and spatial configuration (Gallese, 2017; Ticini et al., 2015). This perspective has been especially influential in discussions of performance-based and spatial practices, where motor and affective resonance play a central role in shaping aesthetic engagement.

At the same time, contemporary art discourse has highlighted tensions between perceptual experience and conceptual interpretation. While many contemporary artworks prioritize conceptual reflection over immediate sensory impact, neuroaesthetic frameworks have been employed to reconsider how perception, embodiment, and situated cognition continue to operate within conceptually driven practices (Minissale, 2011). In this context, neuroaesthetics provides tools for re-examining the relationship between perceptual processes and meaning making in contemporary art, extending beyond traditional visual analysis.

Despite these contributions, the literature also points to limitations in predominantly analytical approaches to aesthetic experience. Aesthetic engagement is widely acknowledged to be subjective, context-dependent, and shaped by individual background, cultural knowledge, and situational factors, making it difficult to fully capture through empirical measurement alone

(Shestova et al., 2024; Vessel, 2021). As a result, purely explanatory models often struggle to account for the experiential complexity and variability inherent in artistic encounters (Mukhopadhyay et al., 2024).

Recent studies therefore indicate a growing interest in interdisciplinary and practice-oriented perspectives that move beyond observation and measurement toward more interactive and embodied forms of aesthetic engagement. The integration of digital media, immersive technologies, and interactive systems has opened new possibilities for understanding aesthetic experience as a process that unfolds through active participation rather than passive perception (Cho & Cho, 2025; Wang & Adams, 2024). Within this emerging landscape, neuroaesthetics increasingly intersects with artistic practices that incorporate neural and affective processes into the dynamics of aesthetic experience itself, pointing toward more responsive and experience-driven orientations in contemporary fine arts.

2. FROM NEUROAESTHETICS TO NEURO-RESPONSIVE ART

The academic literature on neuroaesthetics has established a substantial body of research examining how aesthetic experience is shaped by perception, emotion, and embodiment in fine arts. Drawing on interdisciplinary perspectives from cognitive neuroscience, psychology, and philosophy, neuroaesthetic studies investigate the neural mechanisms underlying aesthetic engagement, emphasizing the role of sensory-motor processes, affective responses, and reward-related systems in encounters with artworks. From this perspective, aesthetic perception is understood not as a passive visual act but as a multi-layered cognitive process involving bodily resonance and emotional appraisal (Contier & Torres, 2016; Di Dio & Vittorio, 2009; Vessel, 2021).

A central contribution of neuroaesthetics lies in its emphasis on the embodied nature of aesthetic experience. Research on embodied aesthetics suggests that viewers engage with artworks through mechanisms of embodied simulation, whereby observed actions, emotions, or spatial dynamics activate corresponding sensorimotor and affective processes in the observer. This approach has been particularly influential in discussions of performance, movement-based practices, and spatial arts, where motor resonance and bodily attunement play a significant role in shaping aesthetic response (Brinck, 2018; Gallese, 2017; Ticini et al., 2015).

Neuroaesthetic research has also highlighted the fundamental role of emotion in aesthetic experience, demonstrating that emotional and motor systems are deeply intertwined in the evaluation of artworks. Both positive and negative aesthetic judgments have been shown to engage domain-general neural

systems associated with affective valuation, memory, and imagination, underscoring the complexity of aesthetic response beyond purely formal or perceptual factors (Di Dio & Gallese, 2021; Quiroga, 2022; Slaby et al., 2025). These findings reinforce the view that aesthetic experience emerges through an interaction of perceptual, emotional, and embodied processes rather than isolated cognitive functions.

Within contemporary art discourse, neuroaesthetics has functioned primarily as an analytical and explanatory framework, offering empirical insights into how artworks are perceived and experienced by viewers. By mapping brain-body correlates of aesthetic engagement, neuroaesthetic approaches complement humanistic interpretations of art, contributing to a more nuanced understanding of sensory, emotional, and cognitive dimensions of artistic experience (Pearce et al., 2016; Shimamura, 2012; van Leeuwen et al., 2022). At the same time, the literature increasingly acknowledges that the subjective, contextual, and situational character of aesthetic experience poses challenges for approaches that rely predominantly on observation and measurement alone (Martina, 2023).

In light of these discussions, neuroaesthetics emerges as a critical conceptual ground for understanding aesthetic experience in fine arts, while also revealing the limits of purely analytical perspectives. As contemporary artistic practices increasingly foreground interaction, participation, and real-time engagement, neuroaesthetic insights begin to intersect with approaches that seek not only to explain aesthetic experience but also to actively incorporate perceptual and affective processes into the dynamics of the artwork itself.

Neuroaesthetic perspectives increasingly intersect with interactive and technology-mediated art practices that foreground audience participation, real-time feedback, and adaptive systems. In these practices, neuroscientific insights are not limited to post-hoc analysis of aesthetic experience but are integrated into the operational logic of the artwork itself. Studies exploring EEG-based interactive artworks demonstrate how neural signals can be used to influence artistic parameters in real time, enabling personalized and responsive aesthetic experiences that deepen emotional and cognitive engagement (J. Chen, 2025).

Alongside EEG-driven systems, machine learning approaches have been employed to model and respond to viewers' emotional states within interactive installations. Research grounded in enactive and embodied aesthetics shows that adaptive systems can predict and modulate aesthetic responses based on sensory engagement, cognitive reflection, and user participation, thereby transforming the artwork into a dynamic environment that evolves through interaction (X.

Chen et al., 2025). Such approaches emphasize responsiveness and adaptation as core aesthetic conditions rather than purely technical features.

Audience participation emerges as a defining element in these contexts, with interactive installations positioning viewers as co-creators of the aesthetic experience. Multisensory environments and participatory interfaces invite spontaneous engagement, blurring the distinction between artwork and audience and reinforcing the role of embodied interaction in meaning-making (Nikolić & Russo, 2020). Empirical studies further suggest that interactivity enhances perceived aesthetic value and emotional impact, underscoring the significance of participation in shaping experiential dimensions of contemporary art (Savaş et al., 2021).

Technology-mediated art practices also extend beyond gallery-based installations, incorporating artificial intelligence, gamification, and neural modeling to support immersive and adaptive aesthetic experiences. AI-driven new media artworks emphasize immediate feedback and personalization, fostering environments in which aesthetic experience unfolds through continuous interaction and co-creation (Lei et al., 2025). Similarly, biologically inspired neural models applied to generative digital art demonstrate how adaptive feedback mechanisms can refine visual expression in real time, aligning artistic processes with perceptual and cognitive dynamics (Li, 2025).

Cumulatively, these developments reflect a broader shift in contemporary fine arts toward responsive and experiential approaches in which aesthetic experience is shaped through interaction, adaptation, and embodied participation. Within this landscape, neuroaesthetic insights increasingly inform artistic practices that engage neural and affective processes as active elements of the artwork's unfolding, marking a transition from explanatory models of aesthetic experience toward more responsive and participatory artistic orientations.

3. NEURO-RESPONSIVE AESTHETICS AS AN ARTISTIC SYSTEM

Contemporary fine art practices increasingly conceptualize artworks not as static objects but as systems capable of responding to viewer input through responsiveness, adaptation, and real-time interaction. Within this paradigm, interactive technologies such as artificial intelligence and virtual reality enable artworks to generate immersive and individualized experiences. AI-driven systems, for example, can analyze subtle forms of user input, including voice or movement, and translate these data into dynamic audiovisual compositions, thereby transforming perception into an active component of the aesthetic

process (Ronchi & Benghi, 2014). This shift foregrounds participation, positioning the viewer as an integral contributor to both the formation and interpretation of the artwork (Ronchi & Benghi, 2014; Yuhan et al., 2024).

A significant development within these practices is the incorporation of neural and affective data into artistic production. Multimodal affective computing approaches, which enable the real-time measurement of emotional intensity, have been employed to strengthen engagement and creativity, particularly in art education contexts (Zhu, 2025). By integrating emotional and neural signals into responsive systems, artworks can adapt continuously to the viewer's experiential state, fostering a more intimate and personalized encounter. This dynamic relationship extends the aesthetic experience beyond visual perception, embedding affect and cognition directly into the operational logic of the artwork.

As a result, artworks are increasingly understood as dynamic experiential systems rather than fixed forms. Interactive and kinetic technologies facilitate this transformation by allowing artworks to evolve in response to audience interaction, producing conditions of interdependence between material, technological, and human elements. Such systems often reflect broader social, ecological, and technological entanglements, emphasizing relationality over autonomy (Gauld, 2014). Interactive installations that employ artificial intelligence exemplify this approach by analyzing viewer input and generating continuously evolving outputs, thus framing artistic experience as collaborative and processual (Bogomyakov & Chistyakova, 2018; Ronchi & Benghi, 2014)

This orientation is evident in the practices of artists who employ technological mediation to activate the body as a site of interaction. The works of Rafael Lozano-Hemmer, for instance, transform spectators into participants whose presence and actions directly shape the unfolding artwork, challenging conventional distinctions between observer and object (Vallejos Fabres & Aburto Espinosa, 2025). Similarly, the kinetic practices of Rebecca Horn and Theo Jansen engage viewers through embodied encounters with movement and materiality, evoking empathic responses that underscore ecological and social interdependence (Gauld, 2014).

The conceptualization of artworks as responsive systems is further supported by theoretical frameworks drawn from neo-pragmatism and practice-oriented social semiotics. These perspectives interpret artworks as communicative structures that remain flexible and open-ended, activating the viewer's imagination and capacity for improvisation (Lola & Aleksandrova, 2021). Meaning, within this framework, emerges through interaction rather than

predefinition, reinforcing the role of the viewer as a co-creator of the aesthetic experience.

Ultimately, contemporary fine art practices are increasingly defined by responsiveness, adaptability, and real-time interaction, marking a decisive move away from static objecthood toward dynamic experiential systems. The integration of neural and affective data intensifies this shift by embedding emotional and cognitive processes within the artwork itself, enabling forms of engagement that are both personalized and embodied. These developments reflect a broader understanding of art as a complex network of material, technological, social, and psychic relations, in which aesthetic experience unfolds through continuous interaction rather than fixed representation (Bogomyakov & Chistyakova, 2018; Goodfellow, 2020).

In technology-mediated art practices, interaction and embodiment have become central to rethinking the role of the audience, foregrounding bodily engagement and viewer agency as constitutive elements of aesthetic experience. Within this context, the body is not treated merely as a perceptual receiver but as an active material through which meaning and experience are produced. Body-focused interactive artworks that draw on somatic approaches such as the Feldenkrais Method emphasize touch, proprioception, and musculo-skeletal awareness, framing bodily organization as integral to self-perception and subjectivity (Loke & Khut, 2011). These practices highlight how embodied awareness shapes aesthetic experience by directly engaging the participant's physical presence.

Closely related to this orientation is the use of digital biofeedback technologies in participatory live-art contexts. Works informed by methodologies such as Bodyweather employ sonically mediated physiological processes and imaginative frameworks to reconfigure participants' relationships with their own bodies (Loke et al., 2012). By translating physiological signals into experiential feedback, these installations create conditions in which bodily sensation, imagination, and technological mediation converge, encouraging participants to reflect on embodiment as a dynamic and malleable process.

Audience agency is further intensified in interactive artworks that operate through cognitive and affective feedback loops. In such systems, participants' emotional and perceptual responses are continuously registered and influence the behavior of the artwork itself, producing a reciprocal exchange between human affect and technological response (Zics, 2011). This form of active spectatorship reframes engagement as an ongoing negotiation, in which the participant's presence actively shapes the unfolding aesthetic environment rather than responding to a predetermined structure.

Digital performance practices similarly challenge conventional distinctions between performer and audience by foregrounding co-creation. The online performance Flanker Origami, for example, demonstrates how spectator interaction and feedback can alter the meaning, structure, and trajectory of the performance itself, effectively transforming viewers into collaborators within the artistic process (Mastrominico, 2023). Here, authorship emerges as distributed and contingent, shaped through collective participation rather than centralized control.

Interactive installations that prioritize physical interaction further complicate traditional notions of subjectivity and authorship. In Sensuous Geographies, participants generate individualized sonic signatures through bodily engagement with human-computer interfaces, emphasizing intersubjectivity and the emergence of subjectivity through shared embodied experience (Han, 2018). Similarly, virtual reality artworks such as InterACTE and Eve, dance is an unplaceable place employ movement and dance as primary interaction modalities, fostering improvisation, collective resonance, and embodied creativity (Jégo & Meneghini, 2020). These works underscore the role of bodily movement as a generative force in shaping aesthetic outcomes.

More recent interactive installations extend these concerns through machine-learning-based computer vision systems that interrogate the limits of digital imaging and representation. Projects such as Embodied Visions use shadow-based visualizations and responsive systems to foreground bodily presence while simultaneously critiquing the abstraction and reduction inherent in computational imaging technologies (Shi et al., 2024). In doing so, they reinforce the centrality of the body as both subject and site of negotiation within technologically mediated environments.

Taken together, these practices demonstrate how the integration of interaction and embodiment in contemporary art reconfigures traditional boundaries of authorship, control, and spectatorship. By situating bodily engagement and audience agency at the core of aesthetic production, technology-mediated artworks transform viewers into active co-creators. This shift enables aesthetic experiences that unfold through embodied interaction, feedback, and reciprocity, ultimately redefining the relationship between artwork, technology, and participant.

4. FUTURE DIRECTIONS OF NEURO-RESPONSIVE AESTHETICS IN FINE ARTS

Future directions in neuro-responsive aesthetics within fine arts increasingly emphasize adaptive artworks capable of responding to viewers' cognitive and affective states over time. Recent studies demonstrate that machine-learning

frameworks can be employed to predict emotional responses to interactive art installations, enabling systems to adjust dynamically to individual users. Models such as Random Forest algorithms have been shown to support cognitive reflection and active personalization, suggesting that artworks can be designed as adaptive systems that respond to emotional variation rather than fixed inputs (X. Chen et al., 2025). This orientation aligns with broader efforts to establish art as an interactive process shaped by ongoing perceptual and affective exchange.

Personalization emerges as a key dimension of these developments, particularly through the use of passive brain-computer interfaces that optimize aesthetic experiences without requiring explicit user feedback. By decoding neural signals associated with aesthetic preference, such systems can tailor artistic outputs to viewers' unique cognitive and emotional profiles, thereby supporting long-term affective engagement with artworks (Welter & Lotte, 2024). This approach shifts personalization from conscious interaction to implicit neural modulation, expanding the temporal depth and continuity of aesthetic interaction.

The integration of neural data with immersive and extended reality environments further extends the scope of neuro-responsive aesthetics. Immersive technologies such as virtual reality and XR platforms offer environments in which neural responsiveness can be embedded directly into spatial and sensory experience. Research in neuroaesthetics and neurorehabilitation suggests that immersive, emotionally resonant environments may enhance psychological well-being and therapeutic outcomes when informed by neural data (Calderone et al., 2025). Within such contexts, aesthetic experience becomes both perceptual and physiological, shaped by continuous feedback between neural activity and environmental response.

Empirical findings from EEG and neuroimaging studies contribute to this perspective by demonstrating that aesthetic experience involves complex interactions among sensory-motor regions, emotional processing centers, and reward-related neural systems (Di Dio & Vittorio, 2009; Vessel & Welke, 2025). These insights support the design of immersive environments that are attuned not only to visual or auditory stimuli but also to underlying neural dynamics, enabling artworks to adapt responsively to embodied perception and affective state.

Together, these developments indicate a broader conceptual shift from representational art toward perception-regulating systems. Neuroaesthetic research highlights the role of predictive processing and the integration of sensory input with internal models in shaping aesthetic experience, suggesting

that artworks may increasingly function as systems that actively modulate perception and emotion rather than depict external realities (Vaisvaser, 2021; Vaisvaser et al., 2024). In this framework, aesthetic experience is understood as an emergent process shaped by continuous negotiation between neural activity, bodily engagement, and environmental structure.

At the same time, the increasing use of adaptive and immersive technologies in art raises new debates concerning reality perception, experiential authenticity, and ethical responsibility. As artworks become more personalized and responsive, distinctions between authentic experience and technologically mediated affect may become increasingly ambiguous, prompting critical reflection on the nature of aesthetic authenticity (Calderone et al., 2025; X. Chen et al., 2025). Ethical considerations related to data privacy, embodiment, and technological dependence also gain prominence, particularly in practices that rely on neural data acquisition and interpretation. Ensuring that such technologies support human agency and well-being, rather than diminishing them, remains a central concern within neuro-responsive art practices (Vanutelli et al., 2025; Welter & Lotte, 2024).

Overall, the future of neuro-responsive aesthetics in fine arts points toward adaptive, personalized, and immersive systems that integrate neural data into aesthetic production. These approaches reposition art as an active regulator of perception and emotion, opening new theoretical and ethical discussions surrounding reality, authenticity, and the evolving relationship between human experience and intelligent systems.

5. CONCLUSION

This chapter has examined neuro-responsive aesthetics as an emerging orientation within contemporary fine arts, situating it at the intersection of perception, embodiment, and technology. Tracing a trajectory from experience-oriented artistic practices through neuroaesthetic frameworks to responsive and adaptive systems, the discussion has shown how aesthetic experience increasingly unfolds as a relational and process-based phenomenon rather than a fixed encounter with static objects. In this context, artworks operate as dynamic systems shaped by interaction, attention, affect, and bodily engagement.

By foregrounding neural and affective responsiveness, neuro-responsive aesthetics reconfigures the role of the viewer from observer to participant and, ultimately, to co-constitutor of the aesthetic event. The integration of interactive technologies, immersive environments, and adaptive systems demonstrates how perception itself becomes an active component of artistic production. Rather than merely representing experience, such artworks modulate and reorganize

perceptual, emotional, and cognitive processes in real time, emphasizing reciprocity and contingency as core aesthetic conditions.

At the same time, the chapter has highlighted conceptual and ethical implications arising from these developments. As artworks increasingly engage neural data and personalized interaction, questions of authorship, agency, experiential authenticity, and responsibility gain renewed significance. Neuro-responsive aesthetics thus not only expands the formal and experiential boundaries of contemporary art but also invites critical reflection on how technological mediation reshapes the relationship between perception, subjectivity, and aesthetic meaning.

Eventually, neuro-responsive aesthetics can be understood as a developing artistic orientation that bridges analytical insights from neuroaesthetics with practice-based, interactive, and embodied approaches in fine arts. By framing aesthetic experience as an evolving system of relations between bodies, technologies, and environments, this perspective contributes to broader discussions on how contemporary art responds to changing conditions of perception, experience, and technological integration.

REFERENCES

Bogomyakov, V., & Chistyakova, M. (2018). Interactivity as a vector of the socialization of art. *Changing Societies and Personalities*, *2*(2), 183–197. https://doi.org/10.15826/csp.2018.2.2.036

Bolat, N. (2025). Changing Perception if Space in Art With Digital Visual Culture and Television. In *Impact of Digitalization on Modern Visual Media* (pp. 171–194). https://doi.org/10.4018/979-8-3373-1967-4.ch007

Brinck, I. (2018). Empathy, engagement, entrainment: the interaction dynamics of aesthetic experience. *Cognitive Processing*, *19*(2), 201–213. https://doi.org/10.1007/s10339-017-0805-x

Calderone, A., De Luca, R., Calapai, R., Mirabile, A., Quartarone, A., & Calabrò, R. S. (2025). Beauty in the shadow of neurodegenerative disease: a narrative review on aesthetic experience, neural mechanisms, and therapeutic frontiers. *Frontiers in Human Neuroscience*, *19*. https://doi.org/10.3389/fnhum.2025.1658617

Chen, J. (2025). Exploring Neuroaesthetics in Interactive Art Experiences Through EEG-Enhanced Artificial Intelligence. *Lecture Notes in Computer Science*, *15770 LNCS*, 20–32. https://doi.org/10.1007/978-3-031-93864-1_2

Chen, X., Ibrahim, Z., & Aziz, A. A. (2025). Predicting emotional responses in interactive art using Random Forests: a model grounded in enactive aesthetics. *Frontiers in Psychology*, *16*. https://doi.org/10.3389/fpsyg.2025.1609103

Cho, T.-Y., & Cho, I.-Y. (2025). A Neuroaesthetic Analysis of Architectural Representation Through the Case of Heatherwick Studio. *Journal of the Architectural Institute of Korea*, *41*(6), 45–56. https://doi.org/10.5659/JAIK.2025.41.6.45

Contier, A. T., & Torres, L. (2016). Neuroaesthetics: Insights into the aesthetic experience of visual art. In *Projective Processes and Neuroscience in Art and Design* (pp. 87–102). https://doi.org/10.4018/978-1-5225-0510-5.ch006

Di Dio, C., & Gallese, V. (2021). Moving Toward Emotions in the Aesthetic Experience. In *Brain, Beauty, and Art: Essays Bringing Neuroaesthetics into Focus* (pp. 22–26). https://doi.org/10.1093/oso/9780197513620.003.0005

Di Dio, C., & Vittorio, G. (2009). Neuroaesthetics: a review. *Current Opinion in Neurobiology*, *19*(6), 682–687. https://doi.org/10.1016/j.conb.2009.09.001

Gallese, V. (2017). Visions of the body. Embodied simulation and aesthetic experience. *Aisthesis (Italy)*, *10*(1), 41–50. https://doi.org/10.13128/Aisthesis-20902

García Moreno, A. E., Becerra Fernández, D., & Navas Carrillo, D. (2024). Innovando en formulaciones artísticas: Nuevas tendencias y perspectivas creativas. *European Public & Social Innovation Review*, *9*. https://doi.org/10.31637/epsir-2024-1730

Gauld, Q. (2014). Empathy beyond the human: Interactivity and kinetic art in the context of a global crisis. *Technoetic Arts*, *12*(2–3), 389–398. https://doi.org/10.1386/tear.12.2-3.389_1

Goodfellow, P. (2020). The artwork as an ecological object. *Technoetic Arts*, *18*(1), 3–17. https://doi.org/10.1386/tear_00022_1

Han, S. J. (2018). The audience experience of immersion through intersubjective embodiment in sensuous geographies (2003). *Journal of Dance and Somatic Practices*, *10*(2), 207–218. https://doi.org/10.1386/jdsp.10.2.207_1

Ippolito, A., Mezzino, D., Porfiri, F., Di Pace, S., Kordkandi, M. N., Ahmed, N. M. M. S., & Panunzi, R. (2024). Contemporary Art in Reality versus Images, an Analysis of the Work of Shirin Abedinirad. In *Springer Tracts in Civil Engineering: Vol. Part F3500* (pp. 45–65). https://doi.org/10.1007/978-3-031-65104-5_3

Jégo, J.-F., & Meneghini, M. B. (2020). Let's Resonate: How to Elicit Improvisation and Letting Go in Interactive Digital Art. *ACM International Conference Proceeding Series*. https://doi.org/10.1145/3401956.3404194

Kaya, Y., Kocalan, M., & Türkdoğan, T. (2025). FROM PAINTED ILLUSIONS TO DIGITAL REALMS: QUADRATURA AND THE DIALECTICS OF VIRTUAL REALITY. *Scientific Culture*, *11*(2), 197–211. https://doi.org/10.5281/zenodo.17316941

Lei, F., Zhang, H., & Ji, F. (2025). AI-Driven Research on Gamified New Media Art in Children's Public Aesthetic Education. *2025 International Conference on Artificial Intelligence and Education, ICAIE 2025*, 733–739. https://doi.org/10.1109/ICAIE64856.2025.11158546

Li, L. (2025). Enhancement algorithm for generative digital art based on pulse-coupled neural networks. *Journal of Computational Methods in Sciences and Engineering*. https://doi.org/10.1177/14727978251391333

Loke, L., & Khut, G. P. (2011). Surging verticality: An experience of balance. *Proceedings of the 5th International Conference on Tangible Embedded*

and Embodied Interaction, TEI'11, 237–240. https://doi.org/10.1145/1935701.1935747

Loke, L., Khut, G. P., & Kocaballi, A. B. (2012). Bodily experience and imagination: Designing ritual interactions for participatory live-art contexts. *Proceedings of the Designing Interactive Systems Conference, DIS '12*, 779–788. https://doi.org/10.1145/2317956.2318073

Lola, G. N., & Aleksandrova, T. I. (2021). Time Code in Modern Art: Discoursive Analysis of Temporal Art-Projects. *Vestnik of Saint Petersburg University. Arts*, *11*(1), 150–166. https://doi.org/10.21638/spbu15.2021.109

Martina, A. (2023). The sensorimotor roots of aesthetic experience. *Sistemi Intelligenti*, *35*(3), 655–662. https://doi.org/10.1422/109322

Mastrominico, B. (2023). Active Spectatorship and Co-creation in the Digital Making of Flanker Origami. *Body, Space and Technology*, *22*, 100–127. https://doi.org/10.16995/bst.9737

Minissale, G. (2011). The psychology of contemporary art. In *The Psychology of Contemporary Art*. https://doi.org/10.1017/CBO9781139094313

Mukhopadhyay, D., Bandyopadhyay, S., Venkatesh, E., & Menon, S. (2024). Exploring complexity-entropy, eye-tracking, experience, creativity, familiarity, and emotional responses to 40 paintings of Raja Ravi Varma – father of Indian modern art. *International Journal of Arts and Technology*, *15*(2), 170–207. https://doi.org/10.1504/IJART.2024.143134

Nikolić, P. K., & Russo, N. L. (2020). Crossing sensory boundaries with creative productions. *Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST*, *323 LNICST*, 420–427. https://doi.org/10.1007/978-3-030-51005-3_34

Pearce, M. T., Zaidel, D. W., Vartanian, O., Skov, M., Leder, H., Chatterjee, A., & Nadal, M. (2016). Neuroaesthetics: The Cognitive Neuroscience of Aesthetic Experience. *Perspectives on Psychological Science*, *11*(2), 265–279. https://doi.org/10.1177/1745691615621274

Quiroga, P. C. (2022). La neuroestética. Investigaciones de la neurociencia cognitiva sobre la percepción de las artes visuales. *Anales Del Instituto de Investigaciones Estéticas*, 249–284. https://doi.org/10.22201/iie.18703062e.2022.120.2778

Ronchi, G., & Benghi, C. (2014). Interactive light and sound installation using artificial intelligence. *International Journal of Arts and Technology*, *7*(4), 377–379. https://doi.org/10.1504/IJART.2014.066456

Savaş, E. B., Verwijmeren, T., & van Lier, R. (2021). Aesthetic experience and creativity in interactive art. *Art and Perception*, *9*(2), 167–198. https://doi.org/10.1163/22134913-bja10024

Shestova, M. A., Zabelina, M. R., Vasilchenko, U. I., & Pemeva, A. V. (2024). The aesthetic experience of Russian expressionism: the contribution of context, curatorial information and art interest. *Voprosy Psikhologii*, *70*(2), 124-135and144.

Shi, Y., Bell, J., & Pediredla, A. (2024). Embodied Visions: Interactive Installations That Reimagine Bodily Presence in Digital Imaging Apparatuses as Shadows. *Proceedings - SIGGRAPH Asia 2024 Art Papers, SA 2024*. https://doi.org/10.1145/3680530.3695436

Shimamura, A. P. (2012). Toward a Science of Aesthetics: Issues and ideas. In *Aesthetic Science: Connecting Minds, Brains, and Experience*. https://doi.org/10.1093/acprof:oso/9780199732142.003.0010

Slaby, R. J., Arioli, M., Tettamanti, M., & Cattaneo, Z. (2025). Neural correlates of negative aesthetic evaluations in visual art: a neuroimaging meta-analysis. *Cerebral Cortex*, *35*(7). https://doi.org/10.1093/cercor/bhaf156

Solik, R. (2023). What do artists teach us? Aesthetic experience and the multi-paradigm nature of contemporary art. *Art Inqiuiry*, *25*. https://doi.org/10.26485/AI/2023/25/19

Sukhanova, O. (2024). PHENOMENOLOGICAL ANALYSIS OF BODILY EXPERIENCE IN AESTHETIC STUDIES. *HORIZON / Fenomenologicheskie Issledovanija/ STUDIEN ZUR PHÄNOMENOLOGIE / STUDIES IN PHENOMENOLOGY / ÉTUDES PHÉNOMÉNOLOGIQUES*, *13*(2), 437–451. https://doi.org/10.21638/2226-5260-2024-13-2-437-451

Ticini, L. F., Urgesi, C., & Calvo-Merino, B. (2015). Embodied Aesthetics: Insight from Cognitive Neuroscience of Performing Arts. In *Contributions To Phenomenology* (Vol. 73, pp. 103–115). https://doi.org/10.1007/978-94-017-9379-7_7

Vaisvaser, S. (2021). The Embodied-Enactive-Interactive Brain: Bridging Neuroscience and Creative Arts Therapies. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.634079

Vaisvaser, S., King, J. L., Orkibi, H., & Aleem, H. (2024). Neurodynamics of Relational Aesthetic Engagement in Creative Arts Therapies. *Review of General Psychology*, *28*(3), 203–218. https://doi.org/10.1177/10892680241260840

Vallejos Fabres, C., & Aburto Espinosa, V. (2025). Cuerpos, miradas y dispositivos. Artistas latinoamericanos y experiencia estética maquínica. *Artnodes*. https://doi.org/10.7238/artnodes.v0i36.431337

van Leeuwen, J. E. P., Boomgaard, J., Bzdok, D., Crutch, S. J., & Warren, J. D. (2022). More Than Meets the Eye: Art Engages the Social Brain. *Frontiers in Neuroscience*, *16*. https://doi.org/10.3389/fnins.2022.738865

Vanutelli, M. E., Banzi, A., Cicirello, M., Folgieri, R., & Lucchiari, C. (2025). Predicting State Anxiety Level Change Using EEG Parameters: A Pilot Study in Two Museum Settings. *Brain Sciences*, *15*(8). https://doi.org/10.3390/brainsci15080855

Vessel, E. A. (2021). Neuroaesthetics. In *Encyclopedia of Behavioral Neuroscience: Volumes 1-3, Second edition* (Vols. 1–3, pp. V3-661). https://doi.org/10.1016/B978-0-12-809324-5.24104-7

Vessel, E. A., & Welke, D. (2025). THE NEUROSCIENCE OF VISUAL ART APPRECIATION. In *Routledge International Handbook of Wellbeing Arts: Arts and Everyday Aesthetics as Positive Psychology Interventions* (pp. 53–64). https://doi.org/10.4324/9781032637297-7

Wang, J. Z., & Adams, R. B. (2024). Modeling Visual Aesthetics, Emotion, and Artistic Style. In *Modeling Visual Aesthetics, Emotion, and Artistic Style*. https://doi.org/10.1007/978-3-031-50269-9

Welter, M., & Lotte, F. (2024). Ecological decoding of visual aesthetic preference with oscillatory electroencephalogram features—A mini-review. *Frontiers in Neuroergonomics*, *5*. https://doi.org/10.3389/fnrgo.2024.1341790

Wiratno, T. A., & Callula, B. (2024). Transformation of Beauty in Digital Fine Arts Aesthetics: An Artpreneur Perspective. *APTISI Transactions on Technopreneurship*, *6*(2), 231–241. https://doi.org/10.34306/att.v6i2.395

Yoon, J., & Kim, J. (2006). The interactive artwork as the aesthetic object: Aesthetic technology converging technological applications and aesthetic discourses. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *4326 LNCS*, 116–126. https://doi.org/10.1007/11944577_12

Yuhan, N., Kornytska, L., Suchkov, D., Alforova, Z., & Boiko, V. (2024). VIRTUAL REALITY AND INTERACTIVE TECHNOLOGIES IN CONTEMPORARY ART: AN ANALYSIS OF CREATIVE OPPORTUNITIES. *Journal of Theoretical and Applied Information Technology*, *102*(24), 9089–9106.

Zhong, W., & Zhang, Y. (2025). Research on Cross-Border Integration and Strategy of Digital Media Technology in Artistic Creation and Communication. *Journal of Cases on Information Technology*, *27*(1). https://doi.org/10.4018/JCIT.383083

Zhu, H. (2025). SPIRITUAL DIMENSIONS OF CREATIVITY: A PHILOSOPHICAL INQUIRY INTO MULTIMODAL AFFECTIVE COMPUTING AND EMOTIONAL GUIDANCE IN ART EDUCATION. *European Journal for Philosophy of Religion*, *17*(2), 248–266. https://doi.org/10.24204/ejpr.2025.4517

Zics, B. (2011). Toward an affective aesthetics: Cognitive-driven interaction in the affective environment of the Mind Cupola. *Leonardo*, *44*(1), 30–37. https://doi.org/10.1162/LEON_a_00090

Chapter 4

The Role of Interactive Tools in Supporting Creative Thinking: An AR/VR-Based Experiential Learning Model and the Example of a Graphic Design Studio

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Introduction

The accelerating technological transformations of the twenty-first century, unforeseeable social issues, and a new work culture based on interdisciplinary production have elevated creative thinking to a central competency in education. Today's students are expected not only to remember or reproduce information, but also to interpret it in different contexts, establish new relationships, and develop original solutions to complex problems. Creative thinking plays a decisive role, particularly in design, art, and technology-based fields, in terms of shaping professional identity, developing forms of expression, and forming innovative production processes. Current discussions on AI-supported art and design applications show that these new production forms, in which human and machine contributions are intertwined, are transforming the concepts of creativity and originality (Gülaçtı & Kahraman, 2025).

This study first addresses the place of creative thinking in education and its relationship with creative problem solving. Subsequently, it discusses how AR/VR can be positioned in learning processes through the experiential learning approach and Kolb's model. The following section examines the place of AR/VR within interactive technologies, findings and trends related to AR/VR-based experiential learning, and common patterns in AR, VR/MR applications, such as creativity processes, motivation, flow, and multiple perspectives. The final part of the chapter presents a proposed model for supporting creative thinking and details a concrete application scenario within

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the framework of an AR/VR-supported studio design in the context of graphic design education.

The Role of Creative Thinking in Education

Recent studies indicate that pedagogical approaches based primarily on knowledge transfer, intolerant of error, and limiting students' original contributions remain dominant in many learning environments. According to Ülger's (2025) review of the literature, creative thinking is seen as having significant potential at all levels of education. However, it is often viewed as an element that is assumed to contribute only indirectly to student development and is not given sufficient space in teaching practices. International frameworks point to a similar picture. The Organisation for Economic Co-Operation and Development (OECD) document The Future of Education and Skills: Education 2030 emphasises that creative thinking is central to individuals' capacity to create new value in order to adapt to the uncertainties they will encounter in rapidly changing social and technological environments. Lucas et al. (2013) define creative thinking as a fundamental learning capacity that enables students to become active participants who produce new meanings, products, and solutions, rather than merely being consumers of information.

This framework shows that creative thinking is becoming increasingly visible in educational discourse but is supported by limited opportunities at the practical level. Although creative thinking is defined as an important competency, most teaching environments lack concrete, sustainable, and pedagogically consistent structures to embed it into classroom processes. Beghetto's (2021) creative learning approach provides an explanatory theoretical grounding for understanding the reasons behind this structural gap. Beghetto states that although creative thinking is included in programmes, it is not systematically integrated into the learning experience, and that the underlying reason for this is that teachers' beliefs, knowledge and willingness to take risks in supporting creative learning are insufficient. He expresses this situation as follows:

"Unless teachers believe that they can support student creativity, have some idea of how to do so, and are willing to try, then it is unlikely that students will have systematic opportunities to engage in creative learning" (Beghetto, 2021, p. 480).

This assessment clearly demonstrates that, despite its inclusion in educational programmes, creative thinking often remains an indirect outcome in practice. It has been observed that even when teachers value creative thinking, they frequently perceive it as competing with academic objectives (Beghetto,

2021). Consequently, this perspective leads to a narrowing of the space allocated to creative learning in classroom practices.

Beghetto's (2016) earlier work further clarifies this picture. For creative learning to emerge, students need a learning context where they can encounter new stimuli and integrate these stimuli with their prior knowledge. Furthermore, it emphasises that a safe learning atmosphere where the meaning produced can be tested through social interaction is one of the fundamental components of this process. It states that merely 'wanting to generate ideas' is not sufficient; students must believe that sharing their ideas is safe (or at least worth the risk) (Beghetto, 2016, p. 13). Amabile's (1996) components model supports these ideas by emphasising the importance of perceived freedom, opportunity to experiment, and support for risk-taking for creativity. Sawyer (2011) argued that creative classroom environments must produce 'structured uncertainty,' as excessive direction and rigid success criteria limit students' original contributions. Kaufman and Beghetto's (2009) 4C model positions 'small c' creativity within everyday learning and production practices, offering a framework consistent with Beghetto's approach. Craft's (2005) emphasis in the educational context suggests that students' ability to take pedagogical risks in their daily decision-making processes is possible in safe classroom environments where teachers view uncertainty as a learning opportunity rather than a threat. Furthermore, Beghetto (2021) emphasises that teachers often eliminate uncertainty by over-structuring learning activities—by predetermining the form of the task, the method, and how the resulting product should look. Such tightly structured lessons make it difficult for students to engage in the creative process with their own original ideas and narrow the learning space (Beghetto, 2021). However, for creative learning to occur, learning environments are needed where uncertainty is used as a pedagogical tool and where students gain space to find their own way.

When these views are considered together, it becomes apparent that creative thinking is not so much a goal expressed in programme outcomes as a dynamic learning capacity that needs to be supported under appropriate pedagogical and affective conditions. Looking at the higher education context, although many universities define critical and creative thinking as cross-disciplinary core competencies in their programme outcomes and graduate competencies (Tuononen et al., 2022; Rampersad, 2013; Georgiou et al., 2022; OECD, 2023), it is observed that the conditions for creative learning described by Beghetto are often not systematically established. Creative thinking is included as an important competency in official documents. However, in classroom processes, it often remains an implicit, indirect, or self-developed achievement.

Recent research focusing on how creative thinking can be supported in educational settings indicates that technology plays an important role in the creative process but is not a decisive factor on its own. A recent meta-analysis examining education technology-based interventions reveals that the use of technology has a positive and significant impact on creative thinking. However, this impact is not realised to the same extent in all applications. It is noted that the magnitude of the effect varies depending on the alignment of the interventions with learning theories (Zaremohzzabieh et al., 2025). Therefore, the fundamental question to be discussed is not 'is technology integration necessary?' but rather 'through which task structures, interaction forms, and pedagogical objectives can technology truly nurture creative thinking?'

Web 2.0 tools, collaborative digital platforms, gamification, digital storytelling, and interactive technologies such as augmented reality (AR) and virtual reality (VR) stand out in this regard. AR and VR occupy a unique position among interactive technologies because they do not limit the learner's relationship with the environment to screen-based content consumption but instead reimagine it through space, body, and objects, offering the user an immersive sense of presence (Karagöl, 2023). AR enables the physical environment to be reinterpreted in different ways by adding digital layers to the real world. VR transforms the experience spatially and sensorially by transporting the learner into a completely virtual environment. When combined with appropriate pedagogical approaches, these technologies can offer powerful experiential spaces that enable the concretisation of abstract concepts, the testing of multiple scenarios, and the development of creative solutions.

Studies in the context of higher education point to a similar trend. Cojocariu and Boghian's (2024) comprehensive review shows that creative thinking is increasingly defined through technology-mediated tasks, collaborative production processes, and interactive environments, yet the field is still represented by a limited number of comprehensive theoretical models. Virtual reality-focused compilations note that VR applications yield remarkable results, particularly in the areas of spatial creativity, flexibility in the design process, and motivation, but that the experiential and interactive mechanisms underlying these effects are not sufficiently explained (Yu & Wang, 2025). Another study focusing on how to support creative thinking highlights the need to consider technology not merely as a tool but in conjunction with the physical, social, and cognitive components of the learning environment (Koç & Demirkan, 2020).

When all these findings are considered together, it becomes clear that AR and VR should be seen not merely as novel or interesting technologies, but as comprehensive interactive learning environments that deepen the experiential

learning cycle and transform the learner's relationship with the content, environment, and other learners. This study also addresses the role of interactive technologies in supporting creative thinking, particularly in the context of AR/VR-based experiential learning. Creative thinking is evaluated not only as the ability to produce original products but also as a multidimensional process that transforms the learner's relationship with problem situations, space, and learning materials. AR and VR offer powerful learning environments that enable students to transform from passive recipients of knowledge to active producers by concretising each stage of Kolb's experiential learning cycle. Therefore, the theoretical foundations of creative thinking and creative problem solving are first addressed in the continuation of the study. Subsequently, the relationship between the experiential learning approach and this process, and how AR/VR technologies deepen this cycle, are discussed.

Creative Thinking and Creative Problem Solving

Creative thinking is generally defined as the capacity to generate new, original, and functional ideas and is addressed in most theoretical models as a dual structure encompassing both the originality of the resulting product and its appropriateness to the context (Runco & Jaeger, 2012, p. 92). Since Guilford's (1950) classic studies, the creative thinking process has been explained through sub-dimensions such as fluency (generating many ideas), flexibility (generating ideas from different categories and perspectives), originality (presenting unusual, unexpected ideas), and elaboration (enriching the ideas generated). Torrance (2008) developed the Creative Thinking Tests to measure these dimensions, thereby establishing a comprehensive framework for assessing creative thinking in educational settings.

In an educational context, the concept of creative problem solving is related to the application of the cognitive characteristics mentioned above in a real problem situation. The problem-solving process consists of stages such as defining and reframing the problem, generating multiple possible solutions, evaluating alternatives, and applying the selected solution (Mumford et al. 2012). In the context of design and art education, this process takes concrete form, for example, in the interpretation of a design brief, the development of different concepts and design options, the testing of sketch–prototype–revision cycles, and the reshaping of the product in line with critical feedback. Therefore, creative thinking is not merely a matter of flashes of genius. On the contrary, it is entirely concerned with process-oriented steps such as problem discovery, information gathering, synthesis, trial and error, and reflection (Sawyer, 2012).

Recent studies indicate that creative thinking needs to be supported in a planned and systematic manner in educational settings. However, although this skill is defined as an important 21st-century competency in education policies and programme outcomes, it is often not structured with regular and sustainable opportunities in classroom practices (Beghetto, 2016; Koç & Demirkan, 2020; Ülger, 2025). Beghetto (2016) emphasises that unless teachers develop the necessary pedagogical creativity knowledge and courage to take risks, students will not find systematic opportunities for creative learning, Ülger (2025) states that creative thinking skills are a component that facilitates learning at all levels from preschool to university and, therefore, creative thinking activities should be included in programmes and the outcomes of these activities should be evaluated. To develop creativity, teaching programmes must include flexible, discovery-based and collaborative activities, creating environments that allow students to think in a multifaceted way, learn from their mistakes and produce original work (Koç & Demirkan, 2020).

The process-oriented structure of creative thinking and creative problem-solving shows that these skills are based on both individual cognitive capacities and the learner's experiential participation, interaction with the environment, and learning cycles supported by effective tasks. Therefore, the sustainable development of creative thinking in educational environments necessitates the design of experiential learning opportunities where students can actively participate in stages such as discovery, trial and error, reflection, and application. This requirement highlights the relationship between theoretical models that support creative thinking and the Experiential Learning approach. It also brings to the fore the potential of interactive technologies such as AR/VR to strengthen this cyclical structure.

Experiential Learning Approach and Kolb Model: Its Relationship with AR/VR

The experiential learning approach considers learning not merely as a cognitive process, but as a dynamic process involving the individual's direct experiences, reflection on those experiences, and the transformation of the insights gained into new actions. Kolb's (1984) experiential learning model explains this process through a four-stage cycle: concrete experience, reflective observation, abstract conceptualisation, and active experimentation. According to the model, the learner first experiences a real situation, then observes and questions that experience. They structure the conclusions they draw at a more abstract level of concepts and principles and, in the final stage, continue the

cycle by applying these concepts in a new situation (Kolb & Kolb, 2018, p. 120).

From the perspective of creative thinking, it is particularly important to apply the experiential learning cycle in situations involving uncertainty and open-ended problems. Kolb and Kolb's (Kolb & Kolb, 2018) four-stage learning cycle—concrete experience, reflective observation, abstract conceptualisation, and active experimentation—provides a multidimensional framework that enables learners to actively participate in creative problem-solving processes such as idea generation, trial and error, and restructuring. Experimental studies based on this approach demonstrate that experiential learning environments support cognitive and affective characteristics associated with creativity. For example, Ayob and colleagues (2012) found that engineering students participating in experiential learning activities structured within the context of a robotics design competition exhibited above-average creative characteristics in their Torrance Test of Creative Thinking profiles. The study revealed that creative components such as flexibility, humour, elaboration, and problem awareness were clearly observed throughout the process. Studies examining design-focused learning environments where students learn by designing, experimenting, and producing emphasise that tasks offering practical experiences, production processes, and reflective evaluation opportunities should be designed to support the development of higher-level skills such as problem solving, collaboration, and creativity (Marshall & Harron, 2018, cited in Kim et al., 2022, pp. 7331–7332). Taken together, these findings suggest that appropriately designed experiential learning cycles provide a strong pedagogical foundation that nurtures creative thinking and creative problem-solving skills.

Augmented reality (AR) and virtual reality (VR) technologies can be considered tools that enrich each stage of the experiential learning cycle. Thanks to AR applications, students can experience the real environment integrated with digital layers. For example, in a science lesson, augmented graphics and information can be added to the physical laboratory environment to support the concrete experience stage. In VR environments, learners can enter a completely different spatial and sensory context, experiencing intense physical and perceptual experiences. These experiences can then be reflected through classroom discussions, critical sessions, digital journals, or portfolios. Students can achieve the abstract conceptualisation stage by relating the processes they experience to design principles, theoretical frameworks, or solution strategies. When the same cycle is repeated by testing new scenarios, alternative design solutions, or gamified tasks in VR/AR environments, a rich

groundwork is laid for students to engage in trial and error, risk-taking, and generating different alternatives (Huang & Musah, 2024; Obeid & Demirkan, 2020). From this perspective, AR and VR transform the experiential learning model from a theoretical framework on paper into concrete, multi-sensory learning experiences that involve the student's body, senses, and spatial awareness in the process.

The Role of AR/VR in Interactive Technologies

In educational technology literature, one of the fundamental components determining the quality of a learning environment is the level of interaction. Moore (1989) divides interaction in education into three basic categories: student–content, student–teacher, and student–student. Anderson (2003) later expanded this model to include teacher–teacher, teacher–content, and content–content interactions in the context of online and distance learning. In technology-mediated learning environments, Hillman and colleagues (1994) revisited the framework to include learner–interface interaction, defining the interaction between the learner and the technological environment they use as a fourth category. Learner–content interaction refers to the dynamic relationship established by the learner with learning materials such as texts, visuals, videos or three-dimensional objects; learner–teacher interaction concerns the nature of guidance, question–answer, feedback and evaluation processes. Student–student interaction encompasses peer collaboration, discussion, and co-production processes. Student-interface interaction refers to the relationship established by the learner with technological environments such as learning management systems, mobile applications, or VR interfaces used to access content and other actors, and indicates the level of usability, accessibility, and ease of interaction of these interfaces (Moore, 1989; Hillman et al., 1994; Kumtepe et al., 2019).

AR and VR-based learning environments are noteworthy because they simultaneously and intensively engage all these forms of interaction. In AR applications, content becomes digital layers superimposed on the physical environment. While the learner interacts with both real objects and virtual elements, the teacher can design cues, tasks, and feedback to guide this experience. In VR environments, students can come together in a shared virtual space to collaboratively design spaces, objects, and forms. Thus, both student-student and student-teacher interaction gains a new dimension in terms of collaborative tasks and spatial experience (Serna-Mendiburu & Guerra-Tamez, 2024). On the other hand, usability and intuitiveness are of great importance in the design of VR interfaces. A complex interface, difficult navigation, or interaction forms (e.g., grabbing, moving, scaling, drawing) that create a high

cognitive load for the user can have a negative impact on the learner's attention and interaction quality. Recent studies show that well-designed VR interaction interfaces reduce cognitive load, thereby increasing immersion, satisfaction, and task performance, while poor interaction design can limit the user experience and the quality of learning outcomes (Chen, 2024; Serna-Mendiburu & Guerra-Tamez, 2024). Therefore, in VR-based educational environments, interface design should be organised in a way that allows students to move easily within the space and interact intuitively with the content. This can be considered an important prerequisite for creative trial-and-error and alternative production processes.

In this context, AR/VR should be considered not merely as current or attention-grabbing technologies, but as interactive learning environments that transform the relationship between the student and the content, the environment, and other learners. What is important for the development of creative thinking is to go beyond the superficial and demonstrative use of technology. Therefore, technology should be integrated with task-based, experiential, and reflective designs that confront students with problems, guide them towards developing different perspectives, and encourage active production. Designing AR and VR applications in this way will enable them to become powerful tools that both diversify and deepen interactions that support creative thinking.

AR/VR-Based Experiential Learning

Augmented reality (AR) and virtual reality (VR) technologies stand out as learning environments that deepen the experiential learning cycle and add new dimensions to students' creative thinking processes. These technologies enable learners to experience problem situations not only at a conceptual level but also in spatial, physical, and sensory dimensions. Recent research, in particular, shows that AR and VR-based learning environments support different dimensions of creative thinking. These environments enable students to generate multiple ideas, develop different perspectives, and use their creative problem-solving skills in scenarios similar to the real world. Furthermore, it is emphasised that these environments support the experiential structuring of stages in the design process, such as planning, experimentation, and review (Cojocariu & Boghian, 2024; Obeid & Demirkan, 2020; Özaltun & Kahraman, 2024; Yu & Wang, 2025).

In this section, the effects of AR and VR/MR environments on creative thinking are discussed under separate subheadings in line with the findings in the literature. Subsequently, the common themes revealed by the studies are discussed.

Creativity in Augmented Reality (AR)-Based Learning Environments

AR-based learning environments facilitate students' ability to concretise abstract concepts, evaluate problem situations from different perspectives, and develop alternative solutions through digital components placed on the physical environment. The interactive, multi-sensory, and spatial richness offered by AR encourages learners not only to receive information but also to actively participate in the process, producing original ideas through trial and error. Huang and Musah's (2024) study in the context of technology-enriched education revealed that the use of AR increases students' creative behaviour, attention and motivation levels, while interactive tasks support original idea generation and problem discovery. Indeed, in AR-supported learning activities, students' flow experiences, characterised by intense focus, partial change in time perception, and being absorbed in the task, were found to be at a higher level compared to traditional methods (Giasiranis & Sofos, 2017). It has been emphasised that AR's visualisation capacity facilitates the conceptual restructuring of abstract content and contributes to students developing their solution proposals in a more varied, flexible, and creative manner. Siregar's (2025) experimental study also revealed that AR-based science learning media created a moderate and meaningful improvement in students' creative thinking skills, with this effect being particularly evident in the processes of discovery, hypothesis development, testing ideas, visualisation, and reorganising solution strategies. When these findings are considered together, it is evident that AR is not merely a technology that enriches learning materials, but a powerful experiential learning tool that activates the fundamental elements of creative thinking.

Research conducted at the higher education level shows that the use of AR has significant potential, particularly in developing creative problem-solving skills. AR-supported problem-based learning applications provide a safe trial-and-error environment where students can repeatedly experience simulated real-life problem situations, thereby activating the fundamental components of creative thinking. In such environments, students not only identify the problem but also generate multiple solution alternatives, develop more effective strategies by comparing these alternatives, and have the opportunity to quickly test and reshape their solutions. In an experimental study conducted by Wongklang and Wipatsopakron (2024) with undergraduate students, a significant and high-level increase in creative problem-solving skills was observed in students who used the problem-based mobile AR application after learning. Another experimental study conducted in a basic design course also showed that AR integration strengthened students' attitudes towards the course,

their motivation and participation levels, and their ability to concretise abstract concepts and express their creative designs (Özaltun & Kahraman, 2024). Furthermore, AR enhances creative thinking even more when students are not merely consuming content but also producing it. In activities where students create their own digital content in AR environments—such as AR story creation, AR-based scientific experiment design, or AR problem scenario development—significant increases have been observed in both divergent (generating many different ideas) and convergent (evaluating generated ideas and selecting the most appropriate one) components of creativity (Cojocariu & Boghian, 2024).

Therefore, it is possible to say that AR-based learning environments are effective, particularly in creative thinking stages such as problem discovery, idea generation, and developing alternative solutions. This effect is fundamentally based on AR technology offering students the opportunity to think from different perspectives and experiment safely by stretching the boundaries of the real world.

Creativity in Virtual Reality (VR) / Mixed Reality (MR) Based Learning Environments

VR (virtual reality) and MR (mixed reality) technologies offer immersive experiences that support creative thinking by transporting the learner into a different spatial and sensory context. In these environments, students do not merely analyse the problem. They can navigate within the space, manipulate objects, and immediately observe the consequences of their design decisions. Obeid and Demirkan's (2020) study with undergraduate design students demonstrated that students working in an immersive VR environment generated more alternative solutions, engaged in more iterations during the design process, and that motivation and flow experience significantly supported this creative process. Yu and Wang's (2025) systematic review also reveals that VR technology enhances creative thinking in higher education, particularly in the fields of art, design, and engineering, and that immersion improves students' task focus, helps them develop new perspectives, and increases the quality of their creative outputs. Similarly, Hu and colleagues' (2016) study on VR-integrated creative thinking instruction found that creative thinking scores in the virtual reality group increased significantly compared to traditional instruction, particularly in the dimensions of fluency and originality, with immersion and interaction being the most sensitive components in this difference. Leong's (2024) findings also show that interactive 3D VR environments extend the time students engage in creative tasks and indirectly enhance creative performance

through sensory richness and experiential participation. On a broader scale, reviews examining the higher education context emphasise that VR applications diversify creative outputs by supporting spatial visualisation, design iteration, and collaborative problem-solving processes (Llanos-Ruiz et al., 2025). These findings indicate that VR/MR-based studio and workshop environments offer powerful experiential learning spaces that support the continuity and depth of the creative problem-solving process.

Mixed reality (MR) environments combine physical and digital spaces, enabling students to use real materials simultaneously with virtual content. Systematic reviews on architecture and basic design studios show that MR applications make design options more visible, enabling students to quickly test different prototypes and participate more effectively in collaborative production processes (Kidik & Asiliskender, 2024). Studies focusing on VR in the field of art and design, when considered within the framework of embodied cognition, reveal that immersive environments make spatial navigation, body movement, and gesture use active components of the creative thinking process and increase students' conceptual diversity, spatial reasoning, and creativity skills (Lehrman, 2025; Serna-Mendiburu & Guerra-Tamez, 2024). In short, VR and MR offer learning environments that reveal students' creative potential in different dimensions by making abstract ideas spatially and sensually experiential.

Common Themes: Motivation, Flow, and Multiple Perspectives

When studies on AR and VR are considered together, three common underlying mechanisms that support creative thinking emerge: motivation, flow, and multiple perspectives.

First, students in AR/VR environments often report higher intrinsic motivation compared to traditional learning methods (Di Serio et al., 2013; Khan et al., 2019; Huang & Musah, 2024; Zaremohzzabieh et al., 2025). Meta-analyses examining education technology-based interventions show that interactive and student-centred digital environments have a moderate but consistent positive effect on creative thinking, with this effect being particularly pronounced in the dimensions of fluid, flexible, and original idea generation (Prasetya et al., 2024; Zaremohzzabieh et al., 2025). Highly motivated students engage with creative tasks for longer periods, experiment more, and continue to generate alternative solutions despite the risk of error. This creates a foundation that indirectly enhances both the number and quality of ideas generated in the creative process.

Secondly, the immersive experiences offered by AR/VR often trigger a state of flow in students. Students experiencing flow lose their sense of time to some

extent, focus intensely on the task, and devote their full attention to the work at hand. Studies conducted in the context of AR show that augmented reality applications enhance students' flow experience and, consequently, their learning effectiveness (Giasiranis & Sofos, 2017). Research and systematic reviews focusing on VR technology reveal that immersion and interaction enhance prolonged engagement with creative tasks and the quality of creative output (Yu & Wang, 2025; Obeid & Demirkan, 2020; Guerra-Tamez, 2023). When considered together, these findings suggest that the intense focus provided by AR/VR environments can support both the quantitative (generating more ideas) and qualitative (developing more original ideas) dimensions of creative thinking.

Thirdly, AR and VR technologies encourage the development of multiple perspectives by enabling students to evaluate a situation from different angles. AR reframes the real world with digital layers, allowing learners to view the same situation through different representations and explanations. This supports the reinterpretation of problem situations and the questioning of conventional thought patterns (Huang & Musah, 2024; Bougsiaa, 2016; Hincapié et al., 2021; Li et al., 2025). VR, on the other hand, transports the student into a completely different, three-dimensional space, offering opportunities to experiment with spatial awareness, three-dimensional visualisation, and design decisions from various perspectives. Studies focusing on art, design, and engineering education emphasise that VR environments expand students' spatial awareness, 3D visualisation skills, and creative forms of expression, thereby contributing to the consideration of problem situations from multiple perspectives (Serna-Mendiburu & Guerra-Tamez, 2024; Molina-Carmona et al., 2018; Roca-González et al., 2017). Gaining a multifaceted perspective facilitates the development of flexibility, a fundamental component of creative thinking, enabling students to produce multiple representations, models, or scenarios related to the same problem.

In short, AR and VR are not magical solutions that increase creative thinking in a single step and directly but rather offer enriched learning environments that facilitate the emergence of creativity by strengthening key intermediate processes such as motivation, flow, embodied experience, and multiple perspectives. Tasks and activities designed with these technologies provide intensive, interactive, and productive learning experiences that students would otherwise have limited exposure to in traditional settings, thereby contributing to the realisation of their creative thinking potential.

A Proposed Model for Supporting Creative Thinking through AR/VR

Numerous studies have shown that the contribution of AR and VR-based learning environments to creativity emerges not through a single variable, but through a holistic structure in which the processes of experience, interaction, and reflection work together (Radianti et al., 2020; Bower et al., 2014; Obeid & Demirkan, 2020). The model proposed in this section re-examines these three principles in the context of creative thinking, in line with the pedagogical requirements of design and art education.

Basic Principles of the Model: Experience – Interaction – Reflection

Experience: AR and VR technologies enable abstract concepts to be experienced at a physical, spatial, and sensory level. The immersive nature of VR allows students to engage deeply and holistically with the problem situation (Slater, 2018; Makransky and Mayer, 2022). AR, on the other hand, reconnects learners with their environment through digital layers superimposed on the real world and concretises problem situations (Bower et al., 2014). At this stage, students naturally experience processes such as multiple observation, problem discovery, and situation analysis, which are the starting points of the creative process. For example, sensorially testing how light–colour–texture combinations alter atmospheric perception in VR increases the student's curiosity and opens the path to creative thinking.

Interaction: AR/VR environments radically increase the interaction between the student and the content, peers, and data. As Radianti and colleagues (2020) point out, VR studios offer much richer learning opportunities than traditional classrooms in terms of joint discussion, collaborative prototyping, and multiple trial and error. Rather than passively receiving information, students shape their thinking through experimental manipulation. They move objects, rearrange them, alter them, and establish new relationships. This process directly supports flexibility and the capacity to generate alternatives, which are fundamental components of creativity.

Reflection: The deepening of creative thinking is possible through reflective steps aimed at mentally processing the student's experience. According to Kolb and Kolb's (2018) learning cycle, transformation arises not from the experience itself but from the conceptualisation and critical evaluation of the experience.

AR/VR activities offer powerful opportunities in this regard:

- In-VR review sessions,
- Peer assessment,
- Digital portfolio notes kept throughout the process,

• Short self-assessment (reflection) reports enable students to question their design decisions, establish cause-and-effect relationships, and develop new creative strategies.

Together, these three components form the Experience - Interaction - Reflection - New Experience cycle, enabling the student to develop a deeper, more flexible, and more creative perspective each time.

The Student's Transformation Process from Passive Consumer to Active Producer

In AR/VR learning environments, the student's role changes in four stages according to their level of cognitive participation and production. The positive effect of this transformation on creative performance is particularly supported by strong findings in design education (Obeid and Demirkan, 2020).

Consumer: The student explores AR/VR content but does not yet engage in production. This stage serves the function of acquiring knowledge and establishing context.

Active Experiencer: The student begins trial and error with interactive tools. Processes such as moving objects, changing parameters, and testing different outcomes emerge at this stage. This process supports the discovery dimension of creativity.

Producer: The student now produces their own content. They design, create stories, and develop models. They can construct a spatial atmosphere within VR or make additions to the physical environment using AR.

Co-Creator: The student begins to create together with other individuals. Joint prototype development, real-time editing, or shared virtual studios enhance creative collaboration.

Upon completion of this transformation, significant improvements are observed in the student's ability to develop original solutions, generate alternatives, and solve problems. Obeid and Demirkan (2020) observed that active producer roles, particularly in design studios, significantly increased creativity measurements.

Application Scenario: An Example of an AR/VR-Supported Studio for Graphic Design Education

This section presents a studio scenario based on an AR/VR-supported experiential learning approach. The scenario aims to support graphic design students' creative thinking skills through experience, interaction, abstract conceptualisation, and reflective evaluation. A recent study by Kalyoncu Fırat and Gülaçtı (2025) also reveals that most of the art and design undergraduate students consider learning AI-based tools necessary and that these tools should

be integrated into the curriculum. Therefore, it demonstrates that the integration of interactive technologies (AR and VR) into design studios in a manner consistent with pedagogical objectives has become a necessity in terms of both supporting creative thinking and curriculum development.

Driven by the need to explain AR/VR-based design learning processes in a more systematic and holistic manner, the study proposes the Experience–Interaction–Reflection model. This structure has been developed as a unique theoretical framework aiming to reveal how creative thinking can be supported step by step in the AR/VR-supported studio process. The components of the model are based on the intersection of three fundamental theoretical strands. First, the experiential learning approach emphasises that learning is shaped not only by the experience itself but also by the processes of reflective thinking and conceptualisation about the experience (Kolb and Kolb, 2018). Second, design studio pedagogy demonstrates that creative problem-solving processes are based on critical interaction, a culture of visual feedback, and multiple trial-and-error cycles (Schön, 1983; Lawson, 2005). Thirdly, current research on AR/VR learning environments reveals that these technologies enrich spatial experience, offer multiple representation possibilities, and enhance students' creative thinking capacity through interaction (Radianti et al., 2020; Obeid and Demirkan, 2020).

The Experience–Interaction–Reflection structure, developed by integrating the three theoretical approaches, provides a high-level framework that guides the pedagogical design of AR/VR-supported graphic design studios. This structure explains the transformation of the student from a passive content recipient to an active and collaborative producer by relating Kolb's experiential learning cycle to the research, production, critique, and revision processes specific to design studios. Thus, the model positions itself as a holistic approach that addresses both the cognitive dimensions of creative thinking and the production practices specific to design education.

The scenario, structured in line with the theoretical framework, demonstrates how the model can be concretised in the context of graphic design education. It aims to integrate the fundamental principles of graphic design—composition, typography, visual hierarchy, rhythm, colour, and visual narration—with the possibilities of AR/VR technologies, thereby enabling the student's multi-level participation in the design process. Furthermore, the fact that fundamental design principles such as composition, hierarchy, and emphasis are decisive in images produced by artificial intelligence-supported systems in today's technologies necessitates that graphic design students experience these principles in interactive environments (Akdağ Satır, 2020).

The learning process begins with sensory and spatial experimentation in a VR environment. It is then taken to the level of interaction through AR-based visual experiments and group discussions. It is then deepened through reflection stages involving poster design, conceptualisation, and peer assessment. The process continues with the redesign of the design and multiple trial-and-error applications, making the student an active subject of the creative cycle.

Thanks to this structure, the scenario goes beyond being merely an application example and takes on the function of a learning model that reveals the pedagogical and theoretical framework of AR/VR-supported graphic design education.

Scenario title: 'Layered Poster Series: AR/VR-Supported Visual Narrative'

Target audience: The scenario targets students studying graphic design at undergraduate level, preferably in their second or third year, who have a command of basic design principles (composition, hierarchy, rhythm, balance, etc.) and can use basic digital design software. Within this framework, participants are expected to have a certain level of conceptual and technical preparedness.

Basic problem situation: Students are asked to transform an abstract concept (transformation, alienation, silence, flow, etc.) into a coherent visual narrative. This narrative will be constructed not only through two-dimensional posters but also through a layered visual language that can be experienced in an AR/VR environment. Thus, students will experience expressing conceptual content by relating it to both traditional 2D graphic design tools and spatial and interactive digital environments.

Expected outputs:

- A series of three posters interpreting the selected concept, conceptually and visually related to each other (e.g. a story in three frames, a three-stage situation or process narrative),
- AR layers that work in conjunction with the relevant poster series (animated typography, additional visual elements, text or icon overlays, etc.),
- A presentation concept in which the posters are placed in a VR environment, a virtual exhibition space, or another digital environment that makes the spatial design visible,
- A structured presentation file reflecting the design process, feedback received, and learning gains.

This complementary structure aligns with the typical learning outcomes of graphic design programmes (poster design, serial design, typographic experiments, creating visual hierarchies) while bringing together the

experiential, interactive, and spatial dimensions that are prominent in the digital age within an educational context. Thus, the scenario aims to help students develop both discipline-specific design skills and contemporary visual communication practices supported by AR/VR.

Learning Objectives and Creative Thinking Dimensions

The scenario aims to acquire technical application skills and activate the components of creative thinking in its cognitive dimension (Guilford, 1950; Torrance, 2008). In this context, students will:

Fluency: Develop a broad repertoire of ideas by producing multiple and varied visual solutions within the defined conceptual framework.

Flexibility: Reinterpret the concept in different ways by restructuring it through different design variables such as typography, image, colour, texture, and movement.

Originality: Develop innovative design proposals based on unexpected relationships that go beyond conventional poster compositions,

Elaboration: It is expected that they can systematically develop their design by relating design micro-decisions such as hierarchy, use of space, alignment, and rhythm to an overall composition.

The contribution of AR/VR use to these cognitive dimensions can be explained at three fundamental levels when related to Kolb's (1984) experiential learning cycle.

1. Experience level: This level, which allows for the internalisation of the spatial and sensory impact of graphic elements (typography, images, colour fields, etc.), enables the student to perceive design relationships directly through embodied experience. It supports flexibility by increasing conceptual awareness.

2. Interaction level: The student's ability to intervene in visual elements, move them, reposition them, and apply them under different scenarios allows them to try out numerous design possibilities in a short time. This interactive process encourages the production of multiple solutions, significantly supporting the dimension of fluidity.

3. Reflection level: Reviewing the produced work in the AR/VR environment, discussing it with peer feedback, and processing it intellectually through self-assessment texts enables the questioning and systematic development of design decisions. This stage feeds the dimensions of detail and originality through critical evaluation and improvement processes.

Within this framework, each of the three levels supports creative cognition through a different mechanism, while together they form a complementary bridge between experiential learning and cognitive creativity.

The contribution of AR/VR use to the cognitive dimensions outlined above can be explained in four fundamental levels when related to Kolb's (1984) experiential learning cycle:

1. Concrete experience level: Experiencing the spatial and sensory impact of graphic elements (typography, images, colour fields, etc.) “from within” the AR/VR environment enables students to perceive relationships such as composition, hierarchy and rhythm through embodied experience. This level strengthens initial conceptual awareness of design relationships, particularly laying the groundwork for flexibility.

2. Interaction and active experimentation level: Interaction processes where students can intervene in visual elements, move them, reposition them, and sequentially experiment with different scenarios enable the rapid generation of numerous alternative solutions. This dynamic trial-and-error environment clearly supports the dimension of fluency by encouraging multiple solution generation.

3. Level of abstract conceptualisation: The observations gained during concrete experience and interaction are rethought and generalised at the level of design principles (balance, emphasis, hierarchy, rhythm, unity, etc.) at this stage. Using feedback from different experiments, the student conceptually understands which visual preferences produce which effects. Thus, the AR/VR environment contributes to the deepening of the dimensions of originality and flexibility, particularly by supporting the formation of abstract principles and schemas related to design.

4. Reflective evaluation and refinement level: Re-examining the produced work in the AR/VR environment, discussing it through peer critique, and processing it intellectually through self-evaluation texts enables the critical evaluation of design decisions. In this process, the student can systematically analyse and develop their work by relating the micro-level decisions of the composition (use of space, alignment, hierarchy, rhythm) to the overall effect. Thus, this level strengthens the dimension of elaboration while also preparing the ground for the conscious structuring of original solutions.

In this context, when the four levels are considered together, the AR/VR environment establishes a holistic link between the experiential learning cycle and the cognitive components of creative thinking. It supports the dimensions of fluency, flexibility, originality, and elaboration through complementary systems.

Studio Flow: Experience, Interaction, Abstract Conceptualisation, and Reflection Cycle

The five-stage studio design presented below demonstrates how the proposed model works in the context of graphic design. Each stage briefly outlines the relationship between the pedagogical objective and the cognitive dimensions of creative thinking.

Stage 1 – Experience: Visual Atmosphere and Narrative Experience (VR)

Objective: For students to experience the relationships between graphic elements (typography, color, image, rhythm) and space and atmosphere as a concrete and sensory experience, thereby recognizing principles such as composition, hierarchy, and rhythm through embodied experience.

Application:

• Students enter virtual environments with different graphic narrative concepts through VR glasses:

A corridor consisting entirely of typographic elements, featuring large fonts, extreme close-ups, and contrasts between full and empty spaces.

An abstract gallery creating rhythm with color and geometric shapes.

An exhibition space where posters cover the walls and some elements extend into the space.

• Students observe the eye's path, focal points, rhythm, and contrast relationships within the space as they navigate these environments.

Creative thinking dimension:

This stage strengthens conceptual awareness, aligning with Kolb's concrete experience level. The student simultaneously becomes both a viewer and a critical observer. This multiple perspective creates a rich experiential foundation for the flexibility and original solution generation that will develop in subsequent stages.

Stage 2 – Interaction: Concept Selection and First Composition Experiments with AR

Objective: To conduct initial experiments in translating abstract concepts into visual language and to use AR as a layered composition tool.

Application:

• Students select concepts in small groups (transformation, flow, conflict, silence).

• Each group defines the classroom walls and floor as their experimental surface. Using the AR application:

They place large typographic words on the wall,

Add color fields and geometric shapes,

Overlay images or icons on specific areas.

• Students test principles such as hierarchy, balance, rhythm, and direction by viewing these layered composition experiments from different angles.

Creative thinking dimension:

This stage relates to Kolb's active experimentation level and particularly activates the fluidity and flexibility dimensions. Rather than fixating on a single solution, the student rapidly tries, breaks, and rebuilds numerous combinations in the flexible environment offered by AR. Ultimately, they create a wide range of solutions.

Stage 3 – Abstract Conceptualization and Production: Designing a 3-Part Poster Series

Objective: To transform the selected concept into a three-part poster series through a consistent visual language and to combine 2D graphic design with the AR/VR experience within a conceptual framework.

Application:

1. Sketch phase:

Each student prepares a three-panel (triptych) visual narrative sketch for their chosen concept.

These three panels are designed to represent a process (beginning–development–transformation), three different states of an emotion, a spatial transition, or a temporal break.

2. Digital design:

Students design three posters using the grid system, typographic hierarchy, and visual metaphors they have determined.

The color palette, font selection, visual–text relationship, and rhythm form the key decision areas of this stage.

The flat version of the poster is first resolved in a classic print/screen logic.

3. Designing AR layers:

An AR layer is conceived for each poster to deepen the concept (animated typography, images that appear/disappear, additional textual layers, icons).

These layers are linked to the poster via a QR code or visual marker.

4. VR preview:

The poster series is placed in a virtual exhibition space.

Students experience their own posters in the VR environment and take notes on scale, distance, and arrangement parameters.

Creative thinking dimension:

This stage is the concrete counterpart of Kolb's abstract conceptualization level in the studio context. Students rethink their observations from previous

experiences and experiments at the level of design principles such as grid, hierarchy, and metaphor. In this way, they consciously structure their conceptual model. The resulting multi-layered narrative particularly enhances the dimensions of originality and elaboration.

Stage 4 – Reflection: VR Critique Session and Individual Reflection

Objective: To enable students to view both their own work and their peers' work from a critical distance and to make their design decisions conscious and articulable.

Application:

• The studio is transformed into a critique session where everyone enters the VR exhibition space together.

• Each student examines their friends' poster series by navigating through them in VR and provides verbal feedback on the following topics:

Legibility of the narrative,

Visual representation of the concept,

Typography–visual–spacing relationship,

Contribution of the AR layer to the design.

• The feedback process is not limited to expressions of liking. Each student is expected to express at least one strength and at least one suggestion for improvement regarding the work they have seen.

• At the end of the session, each student writes a short reflective self-assessment text:

The strengths and weaknesses they notice in their own work,

How the feedback they received transformed their thoughts,

The changes they plan to make during the revision phase.

Creative thinking dimension:

The reflection phase aligns with Kolb's reflective observation level and positions the creative process not only as production but also as a process of thinking about thinking. The student translates intuitive design decisions into conceptual language. They begin to recognize and develop their own creative strategies. This process is critical, particularly in terms of elaboration and justification of originality.

Step 5 – New Experience: Revision and Mixed Presentation (AR + VR)

Objective: To make the cyclical nature of the creative process visible and to restart the learning cycle by transforming the feedback–reflection process into a new experience.

Application:

• Students revise their poster series based on reflective texts and critiques.

• AR layers are reviewed; unnecessary clutter is removed or new additions are made to reinforce the concept.

• The VR exhibition space is rearranged, and the posters are placed in their revised form.

• For the final presentation, a small-scale mixed exhibition is organized within the studio using both physical prints and AR layers:

While viewers (other students, faculty) see the physical posters,

They access the AR layers with their mobile devices,

Short screen recordings or images of the VR versions of the posters are also displayed as part of the portfolio.

Creative thinking dimension:

This final stage represents a return to the new concrete experience point in Kolb's cycle and makes the iterative nature of the creative process visible. By experiencing the initial design - critique - revision - resubmission line as an integral part of creative production, the student internalizes the process as a sustainable practice.

Evaluation of the Scenario

This scenario provides a strong learning environment for graphic design students in the following ways:

• Discipline-specific integrity: Core areas of graphic design, such as poster, typography, serial design, and visual hierarchy, are central to the process. AR/VR is positioned not as a foreign technology added later to this content, but as an integrated environment that tests, reveals, and enriches design decisions.

• Alignment with theoretical model: The sequence of experience (Stage 1), interaction and active experimentation (Stage 2), abstract conceptualization and production (Stage 3), and reflective evaluation and new experience (Stages 4–5) system consistently operates a four-level model that concretizes Kolb's experiential learning cycle and the cognitive components of creative thinking (fluency, flexibility, originality, elaboration) in the AR/VR context.

• Role transformation: The student starts as a passive viewer of ready-made content in the VR environment, but as the process progresses, they transition to the position of a co-producer who designs their own visual world, provides critical input to their peers' productions, and ultimately becomes part of a collective exhibition.

• Making creativity visible as a process: The creative process becomes visible not only through the final poster but also through sketches, AR experiments, VR placement, critique sessions, and reflective texts in a multi-layered way. This shifts creativity from a product-oriented focus to a process- and strategy-oriented framework.

In other words, the scenario offers a theoretically grounded and implementable proposal for addressing one of the fundamental pedagogical challenges of graphic design education in the digital age: moving students from being passive consumers of content to active, experiential, and reflective producers. The AR/VR-supported studio concept makes visible that creative thinking is a dynamic learning practice that develops not only through the resulting product but also through experience, interaction, feedback, and reproduction processes, and redefines the design studio accordingly.

Conclusion

Creative thinking has been found to be a learning capacity that is strengthened by the combined design of open-ended/completely unrestricted task structures, a safe trial-and-error environment, interaction, and reflection cycles, rather than being an outcome that develops spontaneously in educational settings. AR and VR-based learning environments offer powerful experiential spaces that can support the fundamental components of creative thinking (particularly fluency, flexibility, originality, and elaboration) by transforming the learner's relationship with content, space, and peers. However, the positive effects of technology use on creative thinking depend on interventions being designed in line with learning theories. In this process, organizing interaction in a task-based structure and deepening the learning experience through reflective evaluation play a decisive role.

Rather than explaining the contribution of AR/VR-supported learning environments to creativity through a single factor, the Experience–Interaction–Reflection model holistically reveals the cyclical structure of creative thinking as it develops throughout the processes of experience, interaction, and reflection. The studio scenario developed for graphic design education demonstrates how this theoretical framework can be transformed into a concrete teaching design. It describes a learning experience in which the student progresses from being a passive content consumer to an active and collaborative producer. Thus, AR/VR is positioned not as an auxiliary or secondary tool in the design studio, but as a pedagogical environment that enables the experience and restructuring of discipline-specific principles such as composition, hierarchy, rhythm, typography, and narrative.

In conclusion, the AR/VR-based experiential learning approach produces meaningful educational value not by creating a standalone technological effect in supporting creative thinking, but rather when experience, interaction, and reflection processes are consistently integrated with pedagogical objectives.

References

Akdağ, D. (2020). *Kişiselleştirilmiş tasarım: Netflix küçük önizleme görüntülerinin grafik tasarım ilkeleri kapsamında analizi* [Personalized design: An analysis of Netflix thumbnail images within the scope of graphic design principles]. *Yıldız Journal of Art and Design, 7*(2), 177–196. https://doi.org/10.47481/yjad.837848

Amabile, T. M. (1996). *Creativity in context: Update to the social psychology of creativity* (1st ed.). Routledge. https://doi.org/10.4324/9780429501234

Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for interaction. *International Review of Research in Open and Distance Learning, 4*(2), 1–14. https://doi.org/10.19173/irrodl.v4i2.149

Ayob, A., Hussain, A., Mustafa, M. M., & Shaarani, M. F. A. S. (2011). Nurturing creativity and innovative thinking through experiential learning. *Procedia-Social and Behavioral Sciences, 18*, 247–254. https://doi.org/10.1016/j.sbspro.2011.05.035

Beghetto, R. A. (2016). Creative learning: A fresh look. *Journal of Cognitive Education and Psychology, 15*(1), 6–23. https://doi.org/10.1891/1945-8959.15.1.6

Beghetto, R. A. (2021). Creative learning in education. In M. L. Kern & M. L. Wehmeyer (Eds.), *The Palgrave handbook of positive education* (pp. 473–491). Springer. https://doi.org/10.1007/978-3-030-64537-3_19

Bougsiaa, H. (2016). Teaching and learning context in the augmented reality environment. *Ars Educandi, 13*, 23–31. https://doi.org/10.26881/ae.2016.13.02

Bower, M., Howe, C., McCredie, N., Robinson, A., & Grover, D. (2014). Augmented reality in education: Cases, places and potentials. *Educational Media International, 51*(1), 1–15. https://doi.org/10.1080/09523987.2014.889400

Chen, M. X., Zhang, Y., Li, J., & Liu, X. (2024). A survey on the design of virtual reality interaction interfaces: Techniques and challenges. *Sensors, 24*(19), 6204. https://doi.org/10.3390/s24196204

Cojocariu, V.-M., & Boghian, I. (2024). A literature review on digital creativity in higher education: Toward a conceptual model. *Education Sciences, 14*(11), 1189. https://doi.org/10.3390/educsci14111189

Craft, A. (Ed.). (2005). *Creativity in schools: Tensions and dilemmas* (1st ed.). Routledge. https://doi.org/10.4324/9780203357965

Di Serio, Á., Ibáñez, M. B., & Kloos, C. D. (2013). Impact of an augmented reality system on students' motivation for a visual art course. *Computers*

& Education, 68, 586–596. https://doi.org/10.1016/j.compedu.2012.03.002

Georgiou, H., Turney, A., Matruglio, E., Jones, P., Gardiner, P., & Edwards-Groves, C. (2022). Creativity in higher education: A qualitative analysis of experts' views in three disciplines. *Education Sciences, 12*(3), 154. https://doi.org/10.3390/educsci12030154

Giasiranis, S., & Sofos, L. (2017). Flow experience and educational effectiveness of teaching informatics using AR. *Educational Technology & Society, 20*(4), 78–88.

Guerra-Tamez, C. R. (2023). The impact of immersion through virtual reality in the learning experiences of art and design students: The mediating effect of the flow experience. *Education Sciences, 13*(2), 185. https://doi.org/10.3390/educsci13020185

Gülaçtı, İ. E., & Kahraman, M. E. (2025). Sanatın geleceği: Yapay zekâ destekli yaratıcılık ve Türk telif hukukundaki yeni sorunlar [The future of art: AI-supported creativity and new issues in Turkish copyright law]. *Journal of Social, Humanities and Administrative Sciences, 11*(3), 229–245. https://doi.org/10.5281/zenodo.15553955

Guilford, J. P. (1950). Creativity. *American Psychologist, 5*(9), 444–454. https://doi.org/10.1037/h0063487

Hillman, D. C. A., Willis, D. J., & Gunawardena, C. N. (1994). Learner–interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *American Journal of Distance Education, 8*(2), 30–42. https://doi.org/10.1080/08923649409526853

Hincapié, M., Díaz, C., Valencia-Arias, A., Contero, M., & Güemes-Castorena, D. (2021). Educational applications of augmented reality: A bibliometric study. *Computers & Electrical Engineering, 93*, 107289. https://doi.org/10.1016/j.compeleceng.2021.107289

Huang, L., & Musah, A. A. (2024). The influence of augmented reality on creativity, student behavior, and pedagogical strategies in technology-infused education management. *Journal of Pedagogical Research, 8*(2), 260–275.

Kalyoncu Fırat, Ö., & Gülaçtı, İ. E. (2025). Artificial intelligence in art and design: University students' perspectives and curricular implications. *Journal of Social, Humanities and Administrative Sciences, 11*(6), 479–494. https://doi.org/10.5281/zenodo.17778264

Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four C model of creativity. *Review of General Psychology, 13*(1), 1–12. https://doi.org/10.1037/a0013688

Karagöl, A. (2023). Evrenden (Universe) metaevrene (Metaverse) sosyal etkileşimin görselliği üzerine [On the visuality of social interaction from universe to metaverse]. *TRT Akademi, 8*(17), 246–267. https://doi.org/10.37679/trta.1207767

Khan, T., Johnston, K., & Ophoff, J. (2019). The impact of an augmented reality application on learning motivation of students. *Advances in Human-Computer Interaction, 2019*, Article 7208494. https://doi.org/10.1155/2019/7208494

Kidik, A., & Asiliskender, B. (2024). Exploring mixed reality in architectural design education: A systematic review. *DepArch, 3*(2), 177–188. https://doi.org/10.55755/DepArch.2024.33

Kim, J.-Y., Seo, J. S., & Kim, K. (2022). Development of novel-engineering-based maker education instructional model. *Education and Information Technologies, 27*, 7327–7371. https://doi.org/10.1007/s10639-021-10841-4

Koç, O., & Demirkan, Ö. (2020). Yaratıcı düşünmenin eğitim ortamlarında desteklenmesi sürecinde teknoloji entegrasyonunu inceleme [Examining technology integration in the process of supporting creative thinking in educational environments]. *Eğitimde Teknoloji Uygulamaları Dergisi, 1*(1), 58–75. https://doi.org/10.29329/jtae.2020.283.5

Kolb, A. Y., & Kolb, D. A. (2018). Eight important things to know about the experiential learning cycle. *AEL: Australian Educational Leader, 40*(3), 8–14.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.

Kumtepe, A. T., Atasoy, E., Kaya, Ö., Uğur, S., Dinçer, G. D., Erdoğdu, E., & Aydın, C. H. (2019). *An interaction framework for open and distance learning: Learning outcomes, motivation, satisfaction, and perception. AJIT-e: Academic Journal of Information Technology, 10*(36), 7–26. https://doi.org/10.5824/1309-1581.2019.1.001.x

Lawson, B. (2005). *How designers think* (4th ed.). Routledge. https://doi.org/10.4324/9780080454979

Lehrman, A. L. (2025). Embodied learning through immersive virtual reality: Theoretical perspectives for art and design education. *Behavioral Sciences, 15*(7), 917. https://doi.org/10.3390/bs15070917

Leong, W. Y. (2024). Fostering creative thinking using immersive virtual reality in education. *Educational Innovations and Emerging Technologies, 4*(3), 8–25. https://doi.org/10.35745/eiet2024v04.03.0002

Li, S., Shen, Y., Jiao, X., & Cai, S. (2022). Using augmented reality to enhance students' representational fluency: The case of linear functions. *Mathematics, 10*(10), 1718. https://doi.org/10.3390/math10101718

Llanos-Ruiz, D., Abella-García, V., & Ausín-Villaverde, V. (2025). Virtual reality in higher education: A systematic review aligned with the Sustainable Development Goals. *Societies, 15*(9), 251. https://doi.org/10.3390/soc15090251

Lucas, B., Claxton, G., & Spencer, E. (2013). *Progression in student creativity in school: First steps towards new forms of formative assessment* (OECD Education Working Paper No. 86). OECD Publishing. https://doi.org/10.1787/5k4dp59msdwk-en

Makransky, G., & Mayer, R. E. (2022). Benefits of taking a virtual field trip in immersive virtual reality: Evidence for the immersion principle in multimedia learning. *Educational Psychology Review, 34*, 1771–1798. https://doi.org/10.1007/s10648-022-09675-4

Molina-Carmona, R., Pertegal-Felices, M. L., Jimeno-Morenilla, A., & García-Chamizo, J. M. (2018). Virtual reality learning activities for multimedia students to enhance spatial ability. *Sustainability, 10*(4), 1074. https://doi.org/10.3390/su10041074

Moore, M. G. (1989). Editorial: Three types of interaction. *American Journal of Distance Education, 3*(2), 1–7. https://doi.org/10.1080/08923648909526659

Mumford, M. D., Medeiros, K. E., & Partlow, P. J. (2012). Creative thinking: Processes, strategies, and knowledge. *Journal of Creative Behavior, 46*(1), 30–47. https://doi.org/10.1002/jocb.003

Obeid, S., & Demirkan, H. (2023). The influence of virtual reality on design process creativity in basic design studios. *Interactive Learning Environments, 31*(4), 1841–1859. https://doi.org/10.1080/10494820.2020.1858116

Organisation for Economic Co-operation and Development. (2023). *The assessment of students' creative and critical thinking skills in higher education across OECD countries: A review of policies and related practices*. OECD Publishing.Organisation for Economic Co-operation and Development. (2018). *The future of education and skills: Education 2030*. OECD Publishing.

Özaltun, G., & Kahraman, M. E. (2024). The effect of using augmented reality (AR) technology on student attitudes in basic design education. *Electronic Turkish Studies, 19*(4). https://doi.org/10.7827/TURKISHSTUDIES.78006

Prasetya, F., Fortuna, A., Samala, A. D., Rawas, S., Mystakidis, S., Wulansari, R. E., & Kassymova, G. K. (2024). The impact of augmented reality learning experiences based on the motivational design model: A meta-analysis. *Social Sciences & Humanities Open, 10*, 100926. https://doi.org/10.1016/j.ssaho.2024.100926

Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers & Education, 147*, 103778. https://doi.org/10.1016/j.compedu.2019.103778

Rampersad, G. (2014). Creativity as a desirable graduate attribute: Implications for curriculum design and employability. *Asia-Pacific Journal of Cooperative Education, 15*(1), 1–11.

Roca-González, C., Martín-Gutiérrez, J., García-Domínguez, M., & Mato-Carrodeguas, M. del C. (2017). Virtual technologies to develop visual–spatial ability in engineering students. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(2), 441–468. https://doi.org/10.12973/eurasia.2017.00625a

Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal, 24*(1), 92–96. https://doi.org/10.1080/10400419.2012.650092

Sawyer, R. K. (2012). *Explaining creativity: The science of human innovation* (2nd ed.). Oxford University Press. https://doi.org/10.1093/oso/9780195161649.001.0001

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.

Serna-Mendiburu, A., & Guerra-Tamez, R. (2024). Shaping the future of creative education: The transformative power of VR in art and design learning. *Frontiers in Education, 9*, 1388483. https://doi.org/10.3389/feduc.2024.1388483

Siregar, T. (2025, October 13). *Development of augmented reality-based science learning media to enhance creative thinking skills and digital literacy* (SSRN Scholarly Paper No. 5596730). SSRN. https://doi.org/10.2139/ssrn.5596730

Slater, M. (2018). Immersion and the illusion of presence in virtual reality. *British Journal of Psychology, 109*(3), 431–433. https://doi.org/10.1111/bjop.12305

Torrance, E. P. (2008). *Torrance Tests of Creative Thinking: Norms–technical manual (Verbal Forms A & B).* Scholastic Testing Service. (Original work published 1974)

Tuononen, T., Hyytinen, H., Kleemola, K., Hailikari, T., Männikkö, I., & Toom, A. (2022). Systematic review of learning generic skills in higher education: Enhancing and impeding factors. *Frontiers in Education, 7*, 885917. https://doi.org/10.3389/feduc.2022.885917

Ülger, K. (2025). Eğitimde yaratıcı düşünmenin rolü ve önemi açısından gerekliliği üzerine bir araştırma [A study on the necessity of creative thinking in education in terms of its role and importance]. *Sakarya Üniversitesi Eğitim Fakültesi Dergisi, 25*(1), 48–66. https://doi.org/10.53629/sakaefd.1591257

Wongklang, P., & Wipatsopakron, J. (2024). The development of problem-based mobile augmented reality application to enhance creative problem-solving skills for undergraduate students. *International Journal of Interactive Mobile Technologies, 18*(7), 53–67. https://doi.org/10.3991/ijim.v18i07.42261

Yu, H., & Wang, J. (2025). Enhancing college students' creativity through virtual reality technology: A systematic literature review. *Humanities and Social Sciences Communications, 12*, 693. https://doi.org/10.1057/s41599-025-05044-y

Zaremohzzabieh, Z., Ahrari, S., Abdullah, H., Abdullah, R., & Moosivand, M. (2025). Effects of educational technology intervention on creative thinking in educational settings: A meta-analysis. *Interactive Technology and Smart Education, 22*, 235–265. https://doi.org/10.1108/ITSE-11-2023-0224

Chapter 5

The Limits Of Audience Participation and Disembodiment In Online Biennials: Aesthetic and Operational Interaction

Özge KALYONCU FIRAT[1]

Introduction

Technological developments in the digital age are transforming the ways art is produced and exhibited. Consequently, they also affect exhibition spaces and the body-space relationship of the viewer within them. Art viewers establish relationships of presence and identity in the spaces where art exists through exhibitions, fairs, festivals, biennials, triennials, and other various artistic events. These relationships stem from the sense of participation created by existing through the body. The positioning of audience participation in online environments and the extent of audience interaction here involve various limitations. The positioning of the audience in the virtual environment is related to what they can and cannot do, while the type of interaction is related to where it intersects aesthetically and operationally.

Biennials, which are international exhibitions held every two years showcasing contemporary art, have also begun to take their place in online culture, accessible via the internet. The presence of biennials in the online environment has led to the emergence of an online biennial culture that encompasses not only biennials designed exclusively for the internet, but also online editions or digital extensions of physical biennials. Here, digitization, accessibility policies, and the pandemic process have served as structures that nourish online culture. At this point, the boundaries of audience participation in online biennials are also changing. The biennial experience offered to the audience through tools such as computers, phones, or tablets is shaped by the operational interactions offered by the interfaces on the one hand, while on the other hand, it encounters boundaries around the question of the extent to which these interactions are transformed into aesthetic encounters.

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This study aims to examine audience participation and its limitations in online biennials emerging with digitalization, focusing on the axis of disembodiment, and to discuss the operational and aesthetic dimensions of this interaction. The main problem of the study is the question: “Is the audience's participation in the biennial through online platforms via platforms an aesthetic experience, or is it mostly an operational platform interaction?” Here, the question of whether the audience is positioned as an aesthetic subject or as a user also comes to the fore. Conducted using a literature-based descriptive analysis method, the study aims to reveal the dimensions of interaction within the framework of the concept of online biennial culture. In this context, the article focuses on online curatorial practices in the context of digitalization, interaction, disembodiment, and audience participation.

The Transformation of Biennials in Digital Environments

Biennials are comprehensive events that play an important role in the world of art and design, bringing together various art disciplines. Derived from the Italian word “biennale,” biennials are international platforms that are usually held every two years and showcase the most current examples of contemporary art (Biennale, n.d.; Korgavuş & Özkoç, 2024: 56). The term “biennial,” which is often grand in scale, sometimes spread across various locations in a city, sometimes locally specific to certain venues, has a global purpose, and usually includes discursive components such as symposiums, comprehensive publications, or even accompanying magazines alongside a group exhibition, presenting a panoramic view of mostly new generation artists, has become a shorthand for many different recurring exhibitions of contemporary art, including triennial exhibitions and even Documenta, which is held every five years (van Hal, 2010: 4-5).

With the globalization of art in the digital world, many art venues and artistic events have moved online, taking steps towards the democratization of art. Digital steps towards universal accessibility have also led to the transfer of biennial culture to online platforms. Biennials, as biennial artistic events, have moved online as a result of various agendas such as temporariness, claims of publicness, and international networks. In addition, the use of digital platforms has increased as a result of the need for placeless environments in art during the pandemic.

Biennials, which have spread throughout the world since the 19th century and have become an important representation of contemporary art, have undergone certain changes throughout history as they spread across different continents. Each biennial has its own unique understanding and organizational

structure. Biennials are platforms where artists, curators, and collectors come together with the aim of pioneering modern art (Korgavuş & Özkoç, 2024: 56). With this historical background, biennials provide economic and socio-cultural contributions to the urban spaces and communities where they take place. The presentation of exhibitions in virtual reality or online environments has opened the door to the idea that the same exhibition approaches can be adopted in biennials. In the 21st century, online biennials are transforming the viewer experience as a new, emerging culture through the concepts of spatial memory and the body.

Online Biennials

Korgavuş & Özkoç (2024: 58) state that biennials exist in online environments through being designed digitally from start to finish and made accessible by being staged in digital environments. During the pandemic, many biennials were held online, making art more accessible to everyone. Viewers' disengagement from physical experience and their positioning through screens, interfaces, and navigation shifts the dimension of participation to a different plane. In online biennials, the viewer's path of participation is based on various filters, transitions, navigation actions, and clicks. Biennials built on all the possibilities of the digital environment and without physical reference aim to bring artists and viewers together in a more global context. In some cases, physical environments are integrated into the process of the biennials, utilizing their participatory possibilities and organizing simultaneous events.

According to Dumitrescu et al. (2014: 102), the elements required for preparing online exhibitions are as follows:

a- Localization, i.e., familiarizing the user/visitor with the cultural elements presented,

b- Being interesting to ensure visitors access the site,

c- Interaction, i.e., enabling users to interact with the online exhibition. Being able to use any tool or add-on to zoom in on an image or access an explanation in order to better understand a work,

d- Sustainability, meaning that the exhibition can be updated by its organizers when a new explanation or element needs to be added.

e- Accessibility, ensuring that visitors who are physically unable to visit the exhibition can still access it (Tekin, 2022: 130).

The Wrong Biennale is an independent, non-profit, multicultural, and collaborative art biennale established to showcase digital art to a global audience. The biennale is organized online and has a decentralized structure by design. Selected artworks are exhibited both online and offline in pavilions and embassies around the world by independent curators. Held every two years, the biennial brings

together curators, artists, institutions, and the public, creating a widely recognized series of exhibitions internationally as a leading reference in contemporary digital art. Since its inception in 2013, The Wrong Biennale has hosted thousands of artists and curators, and its works have been exhibited in hundreds of pavilions, embassies, and institutions, shaping contemporary art and digital culture worldwide. The founder and chief curator is David Quiles Guillo (The Wrong Biennale, n.d.). Guilló has stated that the entire three-month biennial can be completed in two months by spending only 10 minutes a day at each pavilion (Buffenstein, 2015).

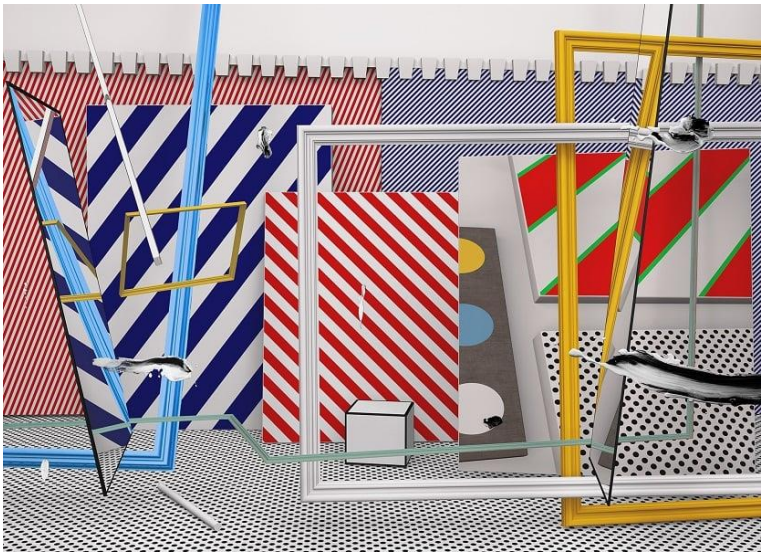

Figure 1: Campaign Visual Prepared by Stefan Saalfeld for The Wrong (again)
Source: https://news.artnet.com/market/worlds-largest-biennial-art-352847
[Accessed December 17, 2025]

Figure 1 shows the campaign visual prepared for The Wrong Biennale (again). The digital biennale takes place through virtual Pavilions and embassies in the physical world, supported by numerous online and live events worldwide. These initiatives were realized with the support of The Wrong Studio and the efforts of many local artists and curators. The 2018 edition was celebrated by The New York Times as “the digital world's answer to Venice” (Dal Dosso, 2023).

Biennials conduct studies aimed at maintaining global communication through various means. Biennials, which already exist physically in cities with their cultural and economic contributions, also exist in digital extensions through online platforms. The Sydney Biennale was the first biennial to offer an online exhibition space on the internet in 2008. This allowed it to occupy a different position both on its continent and in the world (Korgavuş & Özkoç, 2024: 58). As a first in biennial

history, the Sydney Biennale introduced Revolutionsonline, a specially designed online space. Each visit to the platform features a random selection of films, videos, sounds, images, interactive works, live broadcast performances, texts, and links to existing websites (Biennale of Sydney, 2008: 29).

In 2020, due to the pandemic, the fifth B3 Biennial of the Moving Image was held in a hybrid format worldwide. The hybrid format combines virtual elements on the internet with real events in Frankfurt. Interactive platforms have been developed for films, art, games, and XR programs, as well as conferences and events. Prof. Bernd Kracke, artistic director of B3 and rector of the Offenbach University of Art and Design, highlighted the importance of online accessibility for biennials, stating, "With this mix, we can present ourselves appropriately in Frankfurt, while also inspiring participants and visitors worldwide with our program, thereby further increasing our international impact." (HfG Offenbach, 2020). Similarly, the 11th Berlin Biennale, which also coincided with the pandemic period, ended with approximately 30,000 visitors, while its online programs attracted approximately 60,000 visitors according to the official report published, and it was announced that the online program would remain accessible (Berlin Biennale for Contemporary Art, 2020).

The Venice Architecture Biennale brought together a group of national pavilions for its 2021 edition to offer an online program that allows the architecture biennale to be experienced from home. The biennale pavilions, a shared and online digital platform, were designed as a self-organized initiative in addition to the main event (Feniak, 2021). Furthermore, the International Virtual Engravist Printmaking Biennale (Figure 2) is recognized as the world's first virtual printmaking biennale in terms of scope and action and can be visited in a virtual environment. The biennale features 54 countries, over 600 artists, and 7 virtual galleries (Engravist, 2020).

Figure 2: International Virtual Engravist Printmaking Bienal
Source: https://www.engravist.art/international-virtual-engravist-printmaking-bienal-brown-hall/ [Accessed December 15, 2025]

The First Metaverse Architecture Biennale (Figure 3) was constructed as a new frontier that blends the boundaries between the concrete and abstract, real and virtual, past and future, with the aim of conducting a comprehensive exploration of what the future holds for architectural endeavors in the digital realm as we transition into a digital age (Metaverse Architecture Biennale, n.d.). For the first biennale held in 2023, Decentraland provided a large square for the biennale, creating a virtual environment with public spaces where pavilions could be seen side by side, featuring installations, classrooms, and party areas (Yapı Dergisi, 2023).

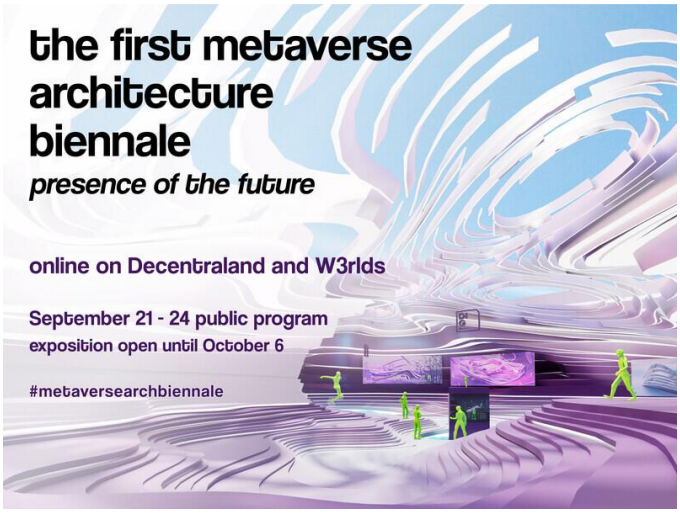

Figure 3: Metaverse Architecture Biennial

Source: https://yapidergisi.com/ilk-metaverse-mimarlik-bienali-presence-of-the-future-21-eylul-6-ekim-tarihleri-arasinda-online-olarak-gosterimde/ [Accessed December 10, 2025]

The 1st International Visual Arts Biennial, held online for the first time in 2021 at Bandırma Onyedi Eylül University, is the first digital biennial organized in Turkey in the field of visual arts (Duman et al., 2021: 270). Bandırma Onyedi Eylül University 1st International Visual Arts Biennial Exhibition The event, organized by the Faculty of Architecture and Design at Bandırma Onyedi Eylül University, is Turkey's first online biennial and is accessible as a virtual tour (Figure 4). Held in an online environment, the biennial was presented in a 360-degree navigable digital environment to recreate the feeling of a physical tour (Tekin, 2022: 130).

Figure 4: Bandırma Onyedi Eylül University 1st International Visual Arts Biennial Exhibition

Source: https://www.bandirma.edu.tr/tr/www/Haber/Goster/Universitemizin-Duzenledigi-1-Uluslararasi-Gorsel-Sanatlar-Bienali-Sona-Erdi-5054 [Accessed December 18, 2025]

The Web Biennial, hosted by the Istanbul Museum of Contemporary Art, is an independent online media art festival. The Web Biennial aims to be a constantly updated online portal for experimental and non-representational electronic art. Focusing primarily on network-based alternative art practices, the biennial was founded in 2003 by artist and theorist Genco Gülan and had its unofficial start with the Reload exhibition in 2002. It continues to raise the profile of media art and serve as a pioneering model for participatory art. It was born before many other applications that serve user content through various social media platforms and has also created a model for them in the Internet environment. It has been held in the online environment and in six different editions in 2003, 2005, 2007, 2010, 2012, and 2014 (Web Biennial, 2020).

Biennale Online, with its international platform-based structure, was launched by Jan Hoet. Biennale Online is a contemporary art exhibition event intended to be held exclusively online. With an approach that prioritizes interaction with artworks, it features a specially designed intuitive web interface combined with artificial intelligence that tracks user preferences. It brings together contemporary art curators from around the world. BiennaleOnline allows access to a selection of artists via any device with an internet connection. The interface has a modular structure designed specifically for visitors, with a design concept that allows route-based navigation, selection criteria, filtering options, and the ability to examine comparisons and close-ups. This allows users to create and tag their own routes (Biennial Foundation, n.d.).

Limits of Audience Participation in Online Biennials

The limits of audience participation vary in online biennial models. Creating the atmospheric effect that physical spaces have on audiences in online spaces depends on the platform's interface design. The navigation of participants, who are physically moving and involved in the experience, through screens and navigation on online platforms qualitatively differentiates audience participation. This differentiation shapes the audience's level of interaction, aesthetic reception process, interpretation, and meaning construction, while also affecting perception processes through the space-body relationship. Therefore, to understand the limits of audience participation, it is necessary to address the concept of disembodiment and discuss the audience's interaction aspects in online biennials through virtual embodiment/disembodiment.

The Concept of Disembodiment

There is a relationship involving mutual interaction between the body and space. This interaction occurs through many internal and environmental factors, by its very nature. At this point, the uniqueness of the body for each individual, along with its sensory processes, and the multiple expressions/understandings of space in terms of quantitative and qualitative data, place the body-space relationship within a field of countless possibilities (Asar, 2023: 165). The relationship between body and space reveals different meanings in each individual and in each situation. An individual's past, present, and/or emotions, along with all the circumstances that shape their identity, leave an impact on the space they perceive through their body. This impact is often perception. In the past, the body was seen as an area that shaped the individual's identity, personality, and existence, and concretized their experiences and emotions. (...) However, today, the body is constantly being redefined and reshaped through fashion and digital technologies (Yeşilyurt, 2025: 189).

Buongiorno (2019: 311) argues that with the advent of digital transformation and ubiquitous information technology, the problem of embodiment has taken on new forms, and that text-based computer-mediated digital culture has even repackaged the Cartesians' desire to transcend the body. (...) The fundamental problem in the digital context here is the apparent disembodiment that characterizes computer-mediated communication, strongly emphasized by cyberculture's promises of anonymity and fluid identity. Asar (2023: 170-171) argues that argues that the inability of different sensory triggers in physical reality to always be present within that experience begins to create gaps in the sensory dimension of spatial perception. These gaps, in turn, are effective in revealing the state of virtual embodiment/disembodiment through the

disappearance of the body as an entity within physical reality, or more accurately, its concealment behind an interface.

Yeşilyurt (2025: 178, 183) discusses the loss of the body or disembodiment in the digital modern world, pointing to the decreasing importance of human bodies and the process of becoming independent from physical existence as a result of the increasing impact of technological developments and digitalization:

"Disembodiment emerges as a phenomenon that redefines our ways of existing and interacting in the digital world. This process refers to the representation and experience of the body in the digital environment, independent of physical spaces. The relationship between humans and the body has entered a complex transformation process alongside modern concepts such as digitalization, dataism, and the fluid society. These concepts have profound effects on the experience, perception, and representation of the human body. Alongside the traditional perception of the body, with the emergence of new paradigms such as digitalization and dataism, the body is now considered not only as a physical entity but also as a digital entity."

With the advancement of technology, all these deviations in the context of the body-space relationship have, on the one hand, influenced the development of the body's boundaries, while on the other hand, they have facilitated the emergence of concepts that can be described as virtual embodiment/disembodiment (Asar, 2023: 170). People now communicate, work, and interact through digital platforms. This allows the body to function independently of space (Yeşilyurt, 2025: 178). This situation can be thought of, in its simplest form, as virtual (other) embodiment, and virtual embodiment/disembodiment is now beginning to transcend the discussion of space as something volumetric or sensory (Asar, 2023: 170-171). Digital platforms and the function of communication affect the reality and dimension of interaction in an individual's disembodiment or virtual embodiment/disembodiment.

Here, Asar (2023: 167) points out that for the formation of spatial perception, both the perceiver and the perceived are necessary, and interaction is unique for each perceiver. Therefore, spatial perception is also customized for each perceiving subject. By interacting with such a dematerialized reality, subjects simultaneously experience a kind of detachment from the materiality of their own bodies and interpret this detachment as a kind of liberation from the boundaries of the body and embodied experience (Buongiorno, 2019: 317). Detachment from the boundaries of embodied experience creates a kind of operational interaction. Interaction in a dematerialized reality exists in the trace left by the viewer on a kind of interface. However, the boundary of aesthetic

interaction in the physical space of the body's materiality intersects with the operational interaction of the interface. Here, we can speak of a new effect based on the coexistence of aesthetic and operational interaction.

In the information age, the way our bodies interact with reality must be reshaped. As Mark B.N. puts it, according to Hansen (2006), the body can be called a coded body, which means a body whose constructive and creative power is expanded through new interactive possibilities offered by the coded programs of artificial reality. (Buongiorno, 2019: 316). Applications linked to artificial intelligence, in particular, pave the way for the human body, as a bodily entity, to become a being that is not involved in the process and creates a kind of virtual embodiment/disembodiment (Asar, 2023: 173).

Disembodiment and its effects in the context of the art object and the viewer are observed according to the interactive dimensions of digital environments. In a broad sense, interaction refers to the activity between the artist and the object of expression or the communication between the artwork and the viewer. The viewer observes the artwork, reflects on it, and understands the creator's intentions. In a narrow sense, it only encompasses interactions performed by individuals using their body movements with digital media or installation images (Yang, 2021: 41). Online exhibitions radicalize the white cube's assumption of a disembodied viewer. The body scales space and our spatial understanding (Asar, 2023: 172). In the creation of immersive interactive experiences in virtual art, the body image produces an aesthetic displacement and a feature of disembodiment. As a component of the virtual illusion space, the body is completely separated from the subject's physicality, and its initial material characteristics in the physiological dimension gradually dissolve (Yang, 2021: 44). Therefore, the body's separation from the physical environment and its existence as virtual embodiment/disembodiment in the digital environment is reconstituted in various ways and differentiated in the viewer's gaze. This new disembodied existence is constructed through the visibility of the aesthetic experience in the viewer and the sensations left by the technical interaction in the viewer.

Aesthetic Interaction and Operational Interaction in the Viewer Experience

Bannon and Bødker's (1991) definition of aesthetic interaction includes the view that aesthetics is instrumental, and that works are adopted in use. This aesthetic interaction encourages improvisation as a fundamental method for users to discover the world around them and learn new aspects (Petersen et al., 2004: 271). The aesthetics of an object arise from the dynamic interaction

between the user and that object and are an integral part of what some researchers in the field of design call aesthetic interaction, while others call it reflective interaction (Locher, 2010: 70).

According to Petersen et al. (2004: 271, 275), aesthetic interaction is not only about conveying meaning and direction through uniform models; it is also about triggering imagination, being thought-provoking, and encouraging people to think about what they are doing with the interactive systems they encounter and how they can be used differently to serve different purposes. Aesthetic Interaction encompasses and emphasizes the experiential aspect of interaction design. Many experiences we see, hear, feel, taste, and smell have been transferred to the virtual world alongside technology in recent years, becoming part of interactive spaces (Şen Atiker, 2024: 212).

According to Boydak (2021: 144), in order to understand today's art and aesthetic understanding, it is necessary to look at the period after 1960. This is because the first art applications, approaches, and works in this field, created through computers, formed the basis of digital art and today's digital culture and aesthetic understanding. To understand the viewer's interaction with the art object, it is necessary to return to the moments when the viewer encounters the space. The viewer, who is expected to interact with the space and the object, and the eye that is included in the exhibition with them, first encounters the atmosphere created in the space (Mckie, 2023: 624). The ways in which the atmospheric perception created by the space in the viewer is realized in online exhibition experiences are shaped around the digital environment and the viewer. In retrospect, the differences in the viewer's moment of encounter began to make themselves felt in the performance art and happenings seen in the 1960s. These approaches created different moments of encounter that freed the viewer from the domination of seeing and being seen, offering opportunities to exist with their own identity. With art moving out of white cubes such as museums and galleries, or with these sacred spaces transforming into relational spaces where social relationships are created, efforts have been made to increase the interaction between art and the audience (Güven Ak, 2019: 1103).

According to Mckie (2023: 624), visitors can interact more easily with space and/or place in designed environments. This is because the visitor's interaction with space occurs both emotionally and physically. While emotional interaction can be achieved with the created environments, the visitor's movement can be directed through placements and restrictions in the area, enabling physical interaction as well. It is known that the postmodern understanding of art is reflected in post-digital works and that these works, together with the concepts of software/hardware, are transformed into actions that are both physical and

mental and interactive with the viewer. In other words, it can be said that in post-digital art, aesthetics takes a backseat, with concepts such as software/hardware taking precedence over aesthetics (Boydak, 2021: 148).

Sassatelli (2016: 1) argues that if we want to understand the formation of aesthetic trends and address the institutional environments involved in the production and consumption of art and culture, biennials offer a privileged perspective. Therefore, how interaction is defined in online biennial practices should be addressed in terms of the viewer's contribution to meaning production. The limit of audience participation lies at the intersection of aesthetic and operational interaction in online biennials. Here, the presence of aesthetic interaction is visible in the sensory impact that the biennial and the works visited via the interface in the computer environment leave on the viewer. At the same time, the permanence of this sensory effect over time and the meaning it creates in the viewer/reader is based on an interpretive relationship. Here, there is an interaction in which the viewer participates in meaning production. The extent of this interaction is related to operational aspects such as clicking, navigating, filtering, and interface usage. Operational interaction now plays a limiting role in aesthetic interaction by including the viewer in a form of participation that positions them as a platform user. The aesthetic visibility of this technical interaction is shaped at this intersection in the context of the qualities and quantities of the viewer and the interface.

Conclusion

Technological tools developed through digitalization are transforming the relationship between artworks and their audiences, and consequently their interaction. As a result of individuals' computer-based lifestyles, life and human relationships with spaces are changing. Individuals' relationship with art is shaped by many individual, social, cultural, economic, and other factors as an aesthetic perception. While access to art is limited for every individual in the world, cultural and art policies are also based on the accessibility of art in this context. The efforts of artists, art institutions, and curators towards the democratization of art have developed internet-based online exhibition and presentation formats. Various exhibitions, artistic events, and biennials held via the internet, especially during the pandemic, have transformed audience participation both in terms of the body-space relationship and the visibility of aesthetic interaction.

Viewers are influenced by the spatial atmosphere at exhibitions or biennials held in physical spaces. Here, an exhibition design that guides visitors, a route that facilitates the circulation of artworks, and interaction networks that

prioritize various relationships are present. Visitors can experience moments of face-to-face encounters with artworks and establish meaningful connections with each piece. The visibility and impact of this communication in the context of the body-space relationship can be read through behaviors. Physical spaces can discipline the body and become visible through behaviors. For example, the spatial atmosphere may condition the visitor not to touch the artwork, or conversely, may suggest touching or participating in it. Here, the contribution of space to interaction is concretely visible. However, the digital is clickable, and the viewer's body has become invisible. Space is now an interface. The linearity of time is gone, and there is always the possibility of returning to the digital environment.

In the context of the relationship between space and the body, the organization of online biennials raises the question of how they add a new dimension and quality to interaction, centered on audience participation. As major contemporary art events, biennials bring together various artists, curators, and audiences in these digital environments within a global context, offering a bodiless, timeless interaction. However, the nature of this interaction is determined by the interface design and the possibilities it offers the audience; it is also shaped by the audience's identity, socio-cultural environment, and external actors. The aesthetic quality of the viewer's interaction with the art object in an online environment can be described as an intellectual encounter. As a result of the viewer's technical relationship with the interface design, the mind performs an operational interaction process. This interaction is flexible, and the intensity and continuity of its aesthetic counterpart is transformed.

The presence of a user navigating a biennial platform through clicking, selecting, and filtering necessitates critical rethinking as a genuine participant. While online biennials contribute to the democratization of art in terms of accessibility, they also impose limitations on the quality of the aesthetic experience. Therefore, considering the relationship established between interfaces and the processes by which users engage with them, it is necessary to take into account a multifaceted network of relationships encompassing the qualitative and quantitative characteristics of interface designs aimed at constructing an atmosphere in the digital environment, curatorial practices, and audience understanding. The process of integrating biennials into the digital environment is still in its early stages of development.

This study aims to reveal the limits of audience participation in online biennial culture through disembodiment/virtual embodiment in the context of aesthetic and operational interaction. The article conceptualizes online biennial culture and examines audience participation on online platforms in the context

of the body-space relationship in order to open up the discourse of interaction with its aesthetic and operational distinctions. Conducted using descriptive analysis, the study samples various online biennials from around the world through purposive sampling, drawing attention to the digital presence of these biennials. The study argues that audience participation in online biennials is strongly established as a technical perception process through operational interaction, and that aesthetic interaction manifests itself at the intersection with operational interaction. Consequently, audience participation in online biennials signifies a process of performing operational interaction within an internet-based platform, alongside an aesthetic moment of encounter.

References

Asar, H. (2023). Beden-mekân ilişkisi aracılığıyla sıradışı bir deneyim alanına açılan mekânsal algı. *Tykhe*, *8*(14), 164–174. https://doi.org/10.55004/tykhe.1247172.2936834

Bannon, L., and Bødker, S (1991) Beyond the interface: Encountering artifacts in use. In J. M. Carroll (Ed.), *Designing interaction: Psychology at the human–computer interface* (pp. 227–253). Cambridge University Press.

Berlin Biennale for Contemporary Art. (2020). *11th Berlin Biennale for Contemporary Art: The crack begins within – Final report*. Berlin Biennale for Contemporary Art. https://11.berlinbiennale.de

Biennale of Sydney. (2008). *16th Biennale of Sydney 2008: Exhibition report*. https://www.biennaleofsydney.art/wp-content/uploads/2021/11/16th-Biennale-of-Sydney-2008-Exhibition-Report.pdf

Biennale. (n.d.). In Oxford Reference online https://www.oxfordreference.com/display/10.1093/acref/9780199239665.001.0001/acref-9780199239665-e-301

Biennial Foundation. (n.d.). *BiennaleOnline*. Biennial Foundation. https://biennialfoundation.org/biennials/biennaleonline/

Boydak, B. (2021). Dijital dönüşümün sosyal bilimler üzerindeki etkileri. In T. Ö. Özgül & S. Beşikci (Eds.), *Sosyal bilimlerde uluslararası dijital dönüşüm konferansı (2–4 Haziran 2021, İstanbul): Tam metin bildiri kitabı* (pp. 45–56). Beykent Üniversitesi Yayınları.

Buffenstein, A. (2015, November 2). *The world's largest art biennial is now online*. Artnet News. https://news.artnet.com/market/worlds-largest-biennial-art-352847

Buongiorno, F. (2019). Embodiment, disembodiment and re-embodiment in the construction of the digital self. *Humana. Mente Journal of Philosophical Studies, 36*, 310–330.

Dal Dosso, S. (2023, November 22). *The Wrong Biennale pavilion "Pink", Berlin*. Domus. https://www.domusweb.it/en/art/gallery/2023/11/22/the-wrong-biennale-pavilion-pink-berlin.html

Duman, O., Kurnaz, A., & Ecevit, M. Z. (2021). Sanal/çevrimiçi etkinliklerin sistem etkinliği, değer, memnuniyet ve sadakat açısından incelenmesi. In *UK Summit 4th International Social Sciences Congress: Book of full texts* (p. 270). Selçuk Kongresi.

Dumitrescu, G., Lepădatu, C., & Ciurea, C. (2014). Creating virtual exhibitions for educational and cultural development. *Informatica Economică, 18*(1), 102–110. https://doi.org/10.12948/issn14531305/18.1.2014.09

Engravist. (2020, June 11). *International Virtual Engravist Printmaking Bienal – Brown Hall*. Engravist. https://www.engravist.art/international-virtual-engravist-printmaking-bienal-brown-hall/

Feniak, H. (2021). *This digital platform allows you to explore the Venice Architecture Biennale 2021 online*. Architizer. https://architizer.com/blog/practice/details/digital-platform-explore-venice-architecture-biennale-2021-online/ Architizer.

Google Arts & Culture. (2022). *6th International Digital Art Biennial (BIAN) 2022* [Online exhibition story]. https://artsandculture.google.com/story/6th-international-digital-art-biennial-bian-2022-elektra/QAVBXNdvesD1zw?hl=en

Güven Ak, K. (2019). Bir karşılaşma ânı olarak sanatta etkileşim. *idil, 61*, 1101-1110. https://doi.org/10.7816/idil-08-61-04

Hansen, M.B.N., (2006) *Bodies in code: interfaces with digital media.* Routledge.

HfG Offenbach. (2020, October 9–18). *B3 Biennal 2020: Truths*. Hochschule für Gestaltung Offenbach. https://www.hfg-offenbach.de/en/calendar/b3-biennal-2020-truths#event

Korgavuş, B., & Özkoç, E. (2024). Bienallerin kentler üzerindeki etkileri: Venedik Bienal Bahçeleri. *Mekansal Araştırmalar Dergisi, 2*(1), 55–70.

Locher, P., Overbeeke, K., & Wensveen, S. (2010). Aesthetic interaction: A framework. *Design Issues, 26*(2), 70–79.

Mckie, E. J. (2023). Sergileme tasarımında duyu kullanımının ziyaretçi-nesne-mekan bağlamında incelenmesi. *RumeliDE Dil ve Edebiyat Araştırmaları Dergisi*, (37), 621-630. https://doi.org/10.29000/rumelide.1407594

Metaverse Architecture Biennale. (n.d.). *About us*. Metaversearch Biennale. https://metaversearchbiennale.com/aboutus

Petersen, M. G., Iversen, O. S., Krogh, P. G., & Ludvigsen, M. K. (2004). Aesthetic interaction: A pragmatist's aesthetics of interactive systems. In *DIS '04: Proceedings of the 5th conference on Designing interactive systems: processes, practices, methods, and techniques*. ACM.

Sassatelli, M. (2016). The biennalization of art worlds: The culture of cultural events. In L. Hanquinet & M. Savage (Eds.), *Handbook of The Sociology of Art and Culture*. Routledge.

Şen Atiker, E. (2024). Sergileme tasarımında çoklu duyusal deneyimler: Van Gogh the Immersive Experience sergisi. *Sinop Üniversitesi Sosyal Bilimler Dergisi*, *8*(1), 209–228.

Tekin, E. (2022). Exhibitions of the virtual world. *Inonu University Journal of Culture and Art/İnönü Üniversitesi Kültür ve Sanat Dergisi*, *8*(1), 127–141. https://doi.org/10.22252/ijca.1109132

The Wrong Biennale. (n.d.). *About*. https://thewrong.org/About

van Hal, M. (2010). *Rethinking the biennial* (Doctoral dissertation). ProQuest Dissertations & Theses Global. https://www.proquest.com/dissertations-theses/rethinking-biennial/docview/2457588896

Web Biennial. (2020, May). *WB 2020 APERION: Web projeleri için açık çağrı*. İstanbul Contemporary Art Museum. https://istanbulmuseum.org/portre/wbacikcagri.html

Yang, S. (2021). Dislocation and disembodiment of interactive body image in Neo-Pop Art. İçinde *Advances in Social Science, Education and Humanities Research, volume 643* (pp. 41–45). Atlantis Press.

Yapı Dergisi. (2023). *İlk Metaverse Mimarlık Bienali "Presence of the Future" 21 Eylül – 6 Ekim tarihleri arasında online olarak gösterimde*. Yapı Dergisi. https://yapidergisi.com/ilk-metaverse-mimarlik-bienali-presence-of-the-future-21-eylul-6-ekim-tarihleri-arasinda-online-olarak-gosterimde/

Yeşilyurt, Y. (2025). Dijital modern dünyada bedenselliğin sonu: bedensizleşme. *Mavi Atlas*, *13*(1), 177–191. https://doi.org/10.18795/gumusmaviatlas.1580017

Chapter 6

The Mystery Of The "Blue Symphony"

Ümit ÖZKANLI[1]

1. INTRODUCTION

"Blue Symphony" is a unique intersection where Burhan Doğançay's artistic genius combines the philosophical depth of historical heritage with the dynamic chaos of modern metropolises. More than just a painting, this work embodies the artist's vision of uniting the spirits of two great civilizations and the rhythms of two different eras in a single visual language. The work's title and the dominant blue color that dominates the canvas are the first and strongest voices that directly connect it to Istanbul's history and spirituality. This blue represents the otherworldly depth of Iznik tiles, which have illuminated the interior of the Sultanahmet Mosque for centuries and embody the finesse of millennia-old craftsmanship. For Doğançay, blue is not just a pigment; it is also a profound cultural identity code that conveys peace, mysticism, and the refinement of the deep-rooted Turkish-Ottoman artistic tradition onto the canvas. The work's texture, technique, and collage material stand directly against this historical depth. The chaotic energy and rapid rhythm of New York, where the artist lived for many years, and of modern metropolises in general, resonate on this surface. The torn posters, text, lines, and three-dimensional forms that have become Doğançay's signature reflect the language of the street, traces of consumer culture, and the city's relentless rhythm. These elements, embracing Pop-Art aesthetics, symbolize the complex and layered reality of rapidly changing urban life [1].

It is at this point that "Blue Symphony" reaches the pinnacle of its artistic power: the artist masterfully combines these two opposing worlds—historical and spiritual Istanbul and modern and chaotic New York—representing historical depth and cultural sophistication. This synthesis transcends the work from a merely local masterpiece into a universal artistic language, positioning it as a timeless artistic legacy that unites the spirit of art and cities on the same

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canvas. This study will deeply examine the technical structure, philosophical origins, and cultural resonances of this masterpiece [1-3].

2. THE WALLS' CALL TO ART

Artist Burhan Doğançay's artistic identity has been shaped not only by his painterly talent but also by his interdisciplinary knowledge and unparalleled powers of observation. His artistic journey, which began in Ankara and expanded internationally, was shaped by his architectural training (in Paris and the US) that laid the foundations for his artistic vision. Architecture provided him with a strong foundation in composition, structural balance, and the relationship between form and space, enabling him to create depth and structural order in his later abstract works, particularly in collage. From the early stages of his career, Doğançay viewed city walls not merely as structural elements but as "mirrors of humanity" and "witnesses of time." According to this philosophy, the torn posters, the inscriptions, the traces left by weather conditions, and the shadows on the walls are all recordings that whisper the collective history, anonymous emotions, and sociological changes of a city and its inhabitants. As a result of this profound observation, the artist created a massive series called Walls of the World, using pieces collected from various metropolises around the world. This series became Doğançay's artistic manifesto and made him an iconic figure on the global art scene [3-7].

3. TRANSFORMATION OF TECHNIQUE

Doğançay's technical genius pushed the boundaries of traditional collage, evolving into montage and relief techniques. The artist not only pasted two-dimensional pieces of paper onto the canvas, but also used real objects such as strings, discarded objects, cones, and torn posters to create a three-dimensional texture. Thanks to this "Material Language," the work transcends painting and takes on a sculptural quality. The most ingenious play in this technique unfolds on the boundaries between Reality and Illusion. Doğançay masterfully combines the real shadows cast on the surface by the real objects he uses with the painted shadows he creates through painting and drawing. This double-layered shadow play evokes the viewer's sense of an optical illusion (trompe-l'œil), resulting in a constantly shifting perception of the work's surface depth. Despite the technical complexity, Doğançay's compositional approach, based on the Power of Color and Form, provides the work with an aesthetic balance. In masterpieces such as "Blue Symphony," in particular, a hidden rhythm and structural order exist within the seemingly fragmented and scattered conical forms, revealing a heightened geometric and color-conscious intelligence

underlying the work's chaotic surface. Figure 1 shows Burhan Doğançay's work "Blue Symphony." [3,7, 8-10]

Figure 1. Burhan Doğançay's work "Blue Symphony"

THE BIRTH OF THE BLUE SYMPHONY

"Blue Symphony" embodies Burhan Doğançay's aim to combine the abstract language of the West with the deep-rooted cultural heritage of the East. The work's primary inspiration is the deep and captivating blue tones of the İznik tiles that adorn the interior of the Sultanahmet Mosque, one of Istanbul's architectural landmarks. The artist aimed to bring this cultural heritage to a modern canvas through his artistic language of torn posters and collage techniques. In this context, the Philosophy of Color forms the essence of the work: **light plays a critical role, particularly in the tonal transitions of the work's eponymous blue. Lighter blue, white, or grayish tones placed adjacent to this dark blue reflect light, highlighting these areas. This contrast creates a sense of brightness within the composition, guiding the eye from dark/deep areas to bright/superficial areas. Sometimes, the artist will apply a high-gloss blue or white paint to the area, pretending that light is seeping from beneath a piece of paper or a tear. This functions as the depicted light itself.**

Blue transcends being merely a pigment and becomes a philosophical tool representing peace, depth, wisdom, and the mystical, otherworldly atmosphere of the East. This magnificent and varied use of blue tones demonstrates Doğançay's effort to blend the aesthetics of Western Pop-Art with the richness and subtlety of Ottoman art. The "Symphony Metaphor," reflected in the work's title, signifies a harmonious orchestration of fragmented forms, sharp lines, and

complex textures. Just as in a musical piece, different visual "voices" (light and dark tones, straight and sinuous forms) come together in the painting to create a powerful pictorial rhythm and harmony that draws the viewer's eye throughout the work. Figure 2 shows Doğançay's Blue Symphony.

Figure 2. Doğançay's Blue Symphony

5. ANALYSIS AND DETAIL

The monumental impact of "Blue Symphony" on the viewer stems largely from the dominance of its composition. With its enormous dimensions of approximately 250 x 450 cm, the canvas evokes the feeling of an architectural façade, drawing the viewer in. This size serves the artist's purpose of conveying the imposing scale of the walls and the layering above them. The central focal points of the work are conical forms and architectural references, often evoking cylindrical or pyramidal shapes rising from the surface. These abstract forms may directly evoke mosque domes, minarets, or even tombs in Turkish architecture, suggesting that the artist, consciously or unconsciously, borrowed the language of form from traditional structures. Another important element that strengthens the work's subtext is the text and signs. Letters, numbers, remnants of slogans, and symbols that appear and disappear on the collage pieces represent the anonymized communication of cities and their traces erased over time, in line with the artist's "Wall Art" philosophy. These worn-out marks add depth to the work's complex surface and enable the viewer to read a subtext that invites the unraveling of a hidden story in each piece.

6. REFLECTION

"Blue Symphony" is not only Burhan Doğançay's personal achievement but also a turning point that redefines the position of Contemporary Turkish Art in the international arena. While the work incorporates local motifs and cultural codes drawn from the tiles of Sultanahmet, it also succeeds in translating these codes into the universal language of global art through collage and abstraction techniques. This dual identity makes the work invaluable to national art history. When examined from an artistic perspective, "Blue Symphony" stands at a unique intersection between Pop-Art (the use of mass media and waste paper) and abstract expressionism (emotional intensity, dynamic gestures, and the original use of materials). Drawing its materials from the spirit of the street, the Pop-Art approach, combined with the depth and layering created by Abstract Expressionism, endows the work with a unique depth and philosophical intensity. This innovative status has earned the work international respect. This artistic prestige has also been crowned with financial success: the work's long-standing title as the "highest-priced painting" in Turkey, radically altering not only the artist's value but also the dynamics of the Turkish art market, creating a major revolution in the perception of collecting and art investment.

7. FROM PAINTING TO OTHER DISCIPLINES

The cultural impact of the "Blue Symphony" was not limited to the visual arts; it also inspired an interdisciplinary dialogue. The most significant resonance in this context is the musical piece "Symphony No. 5," inspired by the painting by renowned composer Kamran İnce. This interaction holds the distinction of being the first major orchestral work inspired by a painting in Turkish art history, demonstrating the strong connection between painting and music. Kamran İnce's Musical Interpretation aimed to recreate the painting's complex layers, forms, and rhythm through the language of sound. The composer bridged the painting's depth, movement, and texture with the rhythm, harmony, and dynamic responses of the musical score. For example, the fragmented conical forms in the painting are countered by sudden tonal shifts or the staccato, contrasting use of instruments in the music, while the serenity of the blue tones is countered by the long, lyrical, and profound passages of the strings. This Inter-Artistic Dialogue has transformed the "Blue Symphony" from a mere visual masterpiece into a creative and rich cultural heritage that inspires different branches of art.

8. FROM PAINTING TO LIGHT AND SHADOW

The use of light in Burhan Doğançay's masterpiece, "Blue Symphony," is one of its most dynamic and philosophically rich elements, transcending the classical understanding of painting [11-14]. Through the use of real objects (collage materials, torn posters, strings, and conical forms) placed on the canvas, the work simultaneously embodies two types of light: Real Light and Painted Light. The extroverted, three-dimensional structures within the work are influenced by the real light of the display environment, creating dynamic and constantly changing real shadows on the surface. This transforms "Blue Symphony" from a static work into a living relief that interacts with its surroundings. Furthermore, the artist uses paint and toning techniques to add false (painted) shadows beneath some of the tears, creating an optical trompe-l'œil. This double-layered shadow play enhances the work's depth and makes it difficult for the viewer to distinguish where reality begins and where illusion begins. The primary color, blue, absorbs light with its deep tones reminiscent of Iznik tiles, creating an infinite depth and otherworldly atmosphere. Brighter tones highlight the textures and tears on the surface, defining the main focal points of the composition. Ultimately, the light in "Blue Symphony" is not just a visual tool but also the embodiment of an artistic philosophy that seeks to capture the spirit of time and place on the walls [13, 14].

In "Blue Symphony," light is not a passive illumination tool, but an active compositional element that interacts with the material, constantly altering depth perception and providing the work's dynamism. Abstract cone and cylinder forms, projecting from the work's surface and evoking architectural elements (domes, minarets, etc.), are the center of the play of light [13,14].

The dance between reality and shadow: these forms are the most affected by the ambient light because they are the parts that rise most from the surface. As the angle of the light source changes (for example, museum lighting may be set differently throughout the day), the actual shadows cast by the cones on the surface of the canvas constantly change location and shape [15,16]. This adds a sculptural dynamism to the work. The concave and convex parts of the cone shapes reflect or absorb light at different rates. This is the main reason why the forms appear voluminous and three-dimensional. Therefore, predicting the meaning attributed to the work contributes to one's creativity. The creativity of these predictions is independent of statistical or mathematical methods or approaches. It is related to the creativity of one's inner world. It is related. [17,18].

9. DISCUSSION AND CONCLUSIONS

"Blue Symphony"'s status as a timeless masterpiece stems from the artist's genius for uniting the spirits of two great civilizations and eras within a single visual language. The work's title and dominant color are a direct homage to Istanbul's history and spirituality. Blue represents the otherworldly depth of the Iznik tiles, the product of a millennia-old craft that adorns the interior of the Sultanahmet Mosque. By using this color, Doğançay not only adds visual aesthetics to his work; he also conveys peace, mysticism, and the refinement of the deep-rooted Turkish-Ottoman artistic tradition onto his canvas. Blue is more than a pigment here; it is a cultural identity code. However, the work's texture, technique, and collage material reflect the chaotic energy of New York, where the artist lived for many years, and of modern metropolises in general. The torn posters, inscriptions, lines, and three-dimensional forms that are Doğançay's signature are the language of the street, consumer culture, and the city's relentless rhythm. This These elements symbolize Pop-Art aesthetics and the complex and layered reality of rapidly changing urban life. By uniting these two opposing worlds—historical depth and modern chaos—the artist transforms "Blue Symphony" into a work that is both local and universal.

REFERENCES

1. Burhan Doğançay, “Symphony in Blue” (Mavi Senfoni); 1987
2. Yılmaz, M. (2013). An overview of Turkish society in the context of art and popular culture. 7. Uluslararası Türk Kültürü, Sanatı ve Kültürel Mirası Koruma Sempozyumu’. 20-29 Haziran 2013, Bakü, Azerbaycan.
3. Burhan Doğançay, “General Urban Walls” Duvar Serisi
4. Burhan Doğançay, “Grego Rolling in Dough” – Grego’nun Duvarları Serisi; 1993
5. Burhan Doğançay, “Tamarind” – “Walls V” Litografi Serisi; 1969
6. Burhan Doğançay, “Tamarind” – “Walls V” Litografi Serisi; 1969
7. The Art Story (2017). Kırmızı sarı siyah gri ve mavili kompozisyon.
8. Burhan Doğançay, “Alexander’s Night” – Alexander Duvarları Serisi; 1996
9. Burhan Doğançay, “Kalp” – Çifte Gerçeklik Serisi; 1986
10. Burhan Doğançay, “Shadow Casting Ribbons” – Aubusson Duvar Dokumaları; 1983
11. Efe, S.B., Varhan, D. 2020. Interior Lighting af a Historical Building By Using Led Luminaires: A Case Study Of Fatih Paşa Mosque, Light & Engineering 28(4), 77–83.
12. S.B. Efe, “UPFC Based Real-Time Optimization of Power Systems for Dynamic Voltage Regulation”, Computer Modeling in Engineering & Sciences. Vol. 116, pp. 391-406, 2018.
13. M.S. Cengiz, “Human Centered Architectural Illumination Design in Prisons”, Light & Engineering, Vol. 30, 2, pp. 46–54, 2022
14. M. S. Cengiz, “Role of Functional Illumınation Urban Beautification: Qatar-Doha Road Illumınation Case”, Light & Engineering, Vol. 30,3, pp. 34-42, 2022.
15. Yardımcı, İ. (2011). Sanatta kitsch kavramı. Anadolu Sanat Dergisi, 11, 163-168.
16. Şahin, H. (2016). Sanatta kitsch olgusu üzerine. Akdeniz Sanat Dergisi, 9(17), 1-27.
17. Cengiz Ç, Metin Karakaş A. 2015. Estimation of weibull renewal function for censored data. Int J Sci Tech Res, 1: 123-132.
18. Cengiz Ç. 2019. Nonparametric estimation of a renewal function in the case of censored sample. Bitlis Eren Univ J Sci Technol, 9(2): 54-57.