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Impact of virtual reality technologies on the perception and interpretation of contemporary art

Abstract. The purpose of the study was to analyse the impact of virtual reality technologies on the emotional perception of contemporary art and determine how the integration of virtual reality changes traditional forms of artistic expression. The methodology was based on the analysis of the main areas of technology use in contemporary art and the investigation of practical examples. The paper discusses the basics of the influence of virtual reality on the emotional perception of art, emphasising how the immersive effect, interactivity, and audio-visual effects create new opportunities for artistic expression. The key role of interactivity in understanding art through virtual reality technologies, including personalisation of the artistic experience, collective interaction, the use of game elements and dynamic content, is considered. Practical examples of the introduction of technologies in traditional art, in particular, in museums, art projects, and exhibitions, are provided. The study analysed the cultural context and its role in integrating digital innovations into contemporary art, considering historical background, social aspects, economic factors, and ethical issues. The main results of the study included: virtual reality significantly enhances the emotional response of viewers through the immersive effect, creating a deeper emotional connection with the work of art. Interactivity allowed viewers to actively interact with art, making the experience more dynamic and personalised. The practical implementation of virtual reality technologies in museums, art projects, and exhibitions demonstrates new ways to interact with cultural heritage and works of art. The cultural context plays an important role in the integration of virtual reality, in particular, the historical, social, economic, and ethical aspects that determine the success of technology implementation in art. These results highlight the significant potential of VR to transform contemporary art, opening up new horizons for creativity and audience engagement, but also point to the need to take important economic and ethical aspects into consideration

Keywords: interactivity; emotional impact; three-dimensional spaces; cultural heritage; digital technologies; art innovations

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INTRODUCTION

Nowadays, technology is constantly changing the way people interact with art. In particular, virtual reality (VR) is becoming an important tool that opens up new opportunities for artists and their audience. VR allows creating a fully interactive and immersive environment where the viewer can interact directly with works of art in three-dimensional space. This radically changes the emotional perception of art, providing new dimensions for its understanding and evaluation.

However, despite the significant potential of virtual reality, there are a number of problems associated with its implementation in the artistic sphere. One of the main problems is the lack of empirical data on how VR affects the emotional perception of art. There is also a need to explore how traditional art forms can integrate with the latest technologies without losing their authenticity and cultural value. Solving these problems is critical for the development of new methods and approaches in artistic activity. The need for research is conditioned by the fact that contemporary art is actively changing under the influence of technological innovations. Virtual reality can become not only a new means of expression for artists, but also a tool to attract a wider audience and deepen the emotional connection to works of art. However, to achieve this, it is necessary to gain a deeper understanding of how technology interacts with traditional art forms, what new opportunities they open up, and what challenges may arise.

Many researchers have addressed the issue of introducing modern technologies into traditional art. For example, L. Shelter (2023) analyses how creating an atmospheric environment in virtual museums affects the perception of art. The researchers come to the conclusion that virtual reality can significantly improve the interactivity and immersion of the viewer, which has a positive effect on the emotional response. A. Modena *et al.* (2021) view virtual and augmented reality as tools for art and politics. They point to the significant potential of these technologies to create new forms of political and artistic expression that push the boundaries of traditional art.

E. Champion and A. Foka (2020) explore the use of virtual reality technologies in the context of art history and cultural heritage. They conclude that VR can be a powerful tool for exploring and preserving cultural heritage, and creating new forms of artistic experience. L. Raya *et al.* (2021) analyse the use of VR to increase interest in art. They conclude that virtual reality helps attract new audiences and increases the level of audience engagement. B. Kelley and C. Tornatzky (2019) discusses artistic approaches to the use of virtual reality. They point out the need to develop new methods of artistic expression that consider the specifics of the virtual environment. J. Sheng (2017) explores the educational potential of VR in art. The researcher concludes that virtual reality can significantly improve the process of learning art, making it more interactive and accessible. Y. Ruan (2022) examines the application of interactive VR technologies in the teaching of art design. She notes that these technologies contribute to a deeper understanding and practical assimilation of knowledge. S. Borysova *et al.* (2024) examine the impact of the digital revolution on contemporary art. They point to significant changes that are taking place under the influence of technology, and the need for further research in this area. Q. Liu (2012) analyses the use of virtual reality in art. He concludes that VR allows creating new forms of artistic expression that would not be possible in traditional media.

W. Zhanjun (2017) explores the use of VR in environmental design. He points out opportunities for creating interactive and immersive environments. C. Tsita *et al.* (2023) explore the possibilities of VR to enhance the educational value of contemporary art. They note that virtual reality can significantly improve the perception and understanding of works of art. K. Iudova-Romanova *et al.* (2023) explore the application of VR in modern theatre. They point to new opportunities for theatrical art that open up due to virtual reality.

The purpose of the study was to explore aspects of the interaction of technology and traditional art in a modern context. In particular, how virtual reality affects the emotional perception of art, what new opportunities and challenges arise in the process of integrating these technologies with traditional art forms.

FUNDAMENTALS OF THE IMPACT OF VIRTUAL REALITY TECHNOLOGIES ON THE EMOTIONAL PERCEPTION OF ART

One of the key aspects of the impact of virtual reality on the emotional perception of art is the immersive effect. Immersion in VR creates a sense of presence in a virtual space, which is significantly different from the traditional contemplation of works of art. The depth of immersion is achieved through the use of special devices, such as VR helmets, which provide full immersion in a three-dimensional environment. This immersive effect allows viewers to feel like they are part of a work of art, rather than just an outside observer. The VR immersion effect affects viewers' emotional responses, enhancing their perception of art (Riva *et al.*, 2007). Immersion allows viewers to not only see works of art, but also interact with them on a deeper level. For example, in VR museums, visitors can freely move around the exhibition, approach works, and view them from different angles, which creates a sense of real presence. This helps to create a more intimate and emotionally rich experience that can evoke stronger emotions than traditional viewing of paintings in a gallery. In addition, the immersion effect contributes to greater involvement of the audience in the artistic process. Virtual environments can be created in such a way that viewers can actively participate in the development of events, change elements of the virtual space, and interact with virtual objects. This allows viewers to feel not just consumers of art, but also active participants in the creative process, which significantly enhances the emotional connection with the work.

Interactivity is another important aspect of the impact of virtual reality on the emotional perception of art. The ability to interact with virtual objects significantly changes the way viewers perceive and evaluate works of art. Using VR, viewers can actively interact with elements of art installations, change them, move in space and influence the development of events in the virtual environment (Wilson & Soranzo, 2015).

Interactivity in virtual reality allows creating unique artistic experiences that are not possible in traditional art

forms. This creates a sense of control and engagement, which greatly enhances the emotional response. The ability to influence a piece of art allows viewers to feel part of the creative process, making their experience more personal and meaningful. This is especially important for creating an emotional connection to works of art. When the viewer has the opportunity to interact with the elements of the installation, change them, create new combinations, this contributes to a deeper understanding of the artistic idea and emotional content of the work. Interactive elements also allow creating more dynamic and changeable artistic spaces that constantly adapt to the viewer's actions, which adds new dimensions to the emotional experience. Audio-visual effects are powerful tools that influence the emotional perception of art in virtual reality. Virtual environments allow artists to use sound and images with extreme flexibility, creating multi-layered audio-visual compositions that can profoundly influence the emotional state of viewers. The role of sound in VR should not be underestimated: it creates an atmosphere, enhances visual images, and can trigger strong emotional reactions (Freeman *et al.,* 2018).

Sound effects can be used to create realistic or fantastic environments. For example, the sounds of nature, city streets, or futuristic landscapes can immerse the viewer in the appropriate atmosphere, enhancing the sense of presence. The soundtrack can also be interactive, changing in response to the viewer's actions, creating even deeper immersion and emotional engagement. Visual effects in VR allow creating exciting three-dimensional worlds with a high level of detail. This can include both realistic images and abstract compositions that cannot be reproduced in the physical world. Visual elements can be dynamic, change in response to viewer interaction, or respond to specific triggers in a virtual environment. This adds an element of unpredictability and innovation to the artistic experience, which causes strong emotional reactions in the audience. Through the use of audio-visual effects, artists can create VR environments that not only impress with their realism or fantasy, but also have a profound impact on the emotional state of the audience. This allows pushing the boundaries of artistic expression and creating new, unforgettable artistic experiences that viewers can experience as they immerse themselves in virtual worlds.

Virtual reality opens up unprecedented opportunities for artists to create new forms of artistic expression that were previously impossible in traditional media. Using VR, artists can create three-dimensional spaces that immerse the viewer in a completely new world, where they can actively interact with works of art, change them, and even influence their development. This expands the boundaries of artistic imagination with new forms of expression that were previously unavailable (Slater & Sanchez-Vives, 2016).

One of the main aspects of new forms of artistic expression in VR is the ability to create interactive installations. Such installations allow viewers to actively participate in the creative process, interact with elements of a work of art, change them and create new combinations. This makes the art more dynamic and personalised, allowing each viewer a unique experience. For example, artists can create virtual environments where viewers can change the colour, shape, or texture of objects, thus creating their own artistic space. In addition, VR allows artists to experiment with new forms of presentation of their works of art. In virtual spaces, it is possible to create complex, non-linear stories where viewers can choose their own path and influence the development of events. This adds a new dimension to art, where viewers become active participants in the story, not just observers. Such interactive narratives can be used to create deep, emotionally rich experiences that leave a strong imprint on viewers' memories.

Virtual reality technologies also open up new opportunities for collaboration between artists from different disciplines. Musicians, artists, programmers, and designers can join forces to create complex virtual worlds where sound, image, and interactivity are combined into a single harmonious composition. Such interdisciplinary projects allow creating multi-layered artistic experiences that are difficult to achieve in traditional art forms.

INTERACTIVITY AS A KEY FACTOR IN UNDERSTANDING ART THROUGH VIRTUAL REALITY AND MODERN TECHNOLOGIES

Personalisation of the artistic experience in virtual reality and with the help of modern technologies opens up new horizons in the understanding of art. One of the key aspects of personalisation is the ability to customise interaction with works of art to suit the individual needs and preferences of the viewer. This allows each viewer to get a unique experience that reflects their personal interests and emotional state.

VR technologies can be used to create individual user profiles that consider their previous interactions with art, preferences, and emotional reactions. Based on this data, the system can adapt content by offering the viewer the works that best suit their interests, or by customising the virtual environment in such a way that it evokes the strongest emotional response (Gotthardt *et al.,* 2023). Personalisation also allows viewers to choose how they want to interact with the artwork. For example, they can set up virtual exposures, choose different viewing modes, or interact with objects using different tools. This creates a deeper and more individual understanding of works of art, as viewers can explore them at their own pace and according to their preferences. Personalising the artistic experience in VR and using modern technologies significantly increases the level of engagement and understanding of art. It helps to create unique, individually customised interactions with artworks, which contributes to a deeper emotional and intellectual perception of art.

Collective interaction in virtual reality and with the help of modern technologies is an important aspect in understanding art, as it allows viewers not only to interact with works of art, but also to share impressions and emotions with other users. Shared virtual art spaces create opportunities for collective viewing and discussion of art, which enhances its emotional and intellectual perception. In VR, viewers can enter virtual galleries and museums with other users, explore expositions together, and discuss what they see in real time. This creates the effect of other people's presence, which adds a social dimension to the artistic experience. For example, viewers can share their impressions, discuss interpretations, and

find new meanings in works of art together (Wang, 2023). Collective interaction also helps to expand the understanding of art through the exchange of opinions and ideas. In shared virtual spaces, users can conduct discussions, participate in virtual lectures and seminars, and organise joint views and discussions. This helps to get different perspectives on the same work, which enriches understanding and enhances the emotional connection with art. It is also worth noting that collective interaction in VR allows artists to create interactive projects where viewers can collaborate with each other to achieve a common goal or create a common work. This adds an element of teamwork and co-creation to the artistic experience, which makes the process of interacting with art even more saturated and meaningful.

Equally important is the use of game elements in art installations created using virtual reality and modern technologies. This is an innovative approach to attracting viewers and increasing their interest in art. Gamification allows integrating game elements into art projects, which makes interaction with art more fun and engaging (Munro, 2022). Game mechanics such as challenges, rewards, difficulty levels, and feedback can be used to create more dynamic and interactive artistic experiences. For example, viewers can perform certain tasks in a virtual environment that help them gain a deeper understanding of a work of art or reveal its hidden aspects. This creates an element of challenge and interest that motivates viewers to explore art more actively. In addition, gamification in art installations allows creating educational elements that help viewers better understand the context of the work or the history of its creation. For example, interactive tasks may include searching for information or solving riddles that reveal additional aspects of a work of art. This not only makes the process of interacting with art more interesting, but also helps to expand the audience's knowledge.

Dynamic content and updated installations in virtual reality and with the help of modern technologies open up new opportunities for creating live, variable artistic experiences that are constantly evolving and adapting. This approach allows viewers to immerse themselves in art that never remains static, but always offers something new and unexpected. One of the key aspects of dynamic content is the ability to update and modify artwork in real time. This may include changing visual elements, adding new objects or scenes, and integrating new audio-visual effects. This constant variability allows viewers to return to the same works again and again, each time discovering something new (Nakevska *et al.,* 2014). This increases the emotional and intellectual interest in art.

Updated installations can also include interactive elements that respond to viewers' actions. For example, virtual objects can change their shape or colour depending on the user's movements or choices. This creates a sense of active participation in the creation of art and enhances the emotional connection with the work. In addition, dynamic content allows artists to experiment with new forms of expression, creating multi-layered, complex compositions that can change in response to external factors, such as the time of day, weather conditions, or even the mood of the audience. This adds an element of unpredictability and innovation to the artistic experience. Thus, dynamic content and updated installations in VR and with the help of modern technologies open up new perspectives for artistic creativity and perception, allowing users to create live, interactive experiences that are constantly evolving and attract viewers to new levels.

PRACTICAL EXAMPLES OF THE INTRODUCTION OF VIRTUAL REALITY TECHNOLOGIES IN TRADITIONAL ART

Museums actively use virtual reality technologies to create virtual expositions that allow visitors to immerse themselves in three-dimensional spaces where they can interact with works of art. This includes virtual tours where viewers can move freely around the museum's halls, view exhibits from different angles, and get additional information about them (Parker & Saker, 2020). Such technologies also allow creating reconstructions of historical events or exhibitions that have already been completed, giving viewers the opportunity to relive them. VR technologies help museums to attract a wider audience, including people who are physically unable to visit the museum.

One of the most famous museums in the world, the Louvre in Paris, presented a VR installation called "Mona Lisa: Beyond glass" (Fig. 1). This installation allows visitors to explore the famous portrait by Leonardo da Vinci in a virtual space. Using VR technology, viewers can see details of the painting that are usually difficult to see through thick protective glass and get additional information about the history and context of the creation of this masterpiece. This project was part of the celebration of the 500th anniversary of Da Vinci's death, providing visitors with a unique opportunity to better understand and appreciate art.

Figure 1. Three-dimensional "Mona Lisa". Louvre Museum, Paris
Source: Ukrinform.ua (2019)

The Pompidou Centre in Paris also uses VR to create innovative art projects. One such example is "Starry Night", a VR installation that allows visitors to enter the interior of Vincent Van Gogh's famous painting "Starry Night". Using VR, viewers can explore the space, details and atmosphere of the painting, which allows them to gain an understanding of the work and its context. It also allows visitors to experience a unique artistic experience that cannot be obtained by traditional painting viewing alone (Fig. 2).

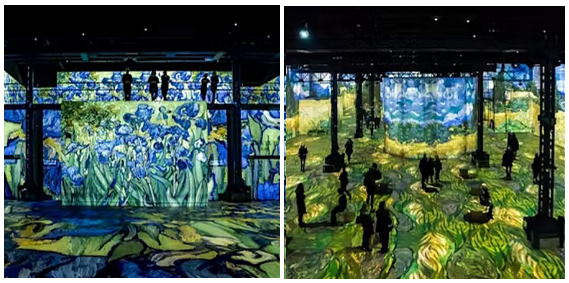

Figure 2. Pompidou Centre, France. Installation of V. Van Gogh's painting "Starry Night"
Source: Tigets (2024)

The British Museum is also actively using VR to improve the visitor experience. One of these projects is the "Virtual tour of Nefertiti" (Fig. 3). Using VR helmets, visitors can travel back in time and see what the Nefertiti temple looked like in its original state. This VR installation allows viewers to immerse themselves in the atmosphere of ancient Egypt, learn more about the architecture and culture of that time, and see the exhibits in their original context. This not only expands the knowledge of visitors, but also makes visiting the museum more interactive and exciting.

Figure 3. One of the images of the virtual tour of the Temple of Nefertiti, British Museum, London
Source: TheTourGuy (2023)

The Museum of Modern Art in New York uses VR technologies to create innovative art exhibitions. One of these projects is "Unseen", created by M. Chitilom (Fig. 4). This VR installation takes viewers into a world where they can interact with digital objects and shapes that change according to the user's movements. The project explores the boundaries between reality and virtuality, inviting visitors to rethink their perception of space and form. This not only elicits an emotional response, but also encourages critical thinking about the role of technology in contemporary art.

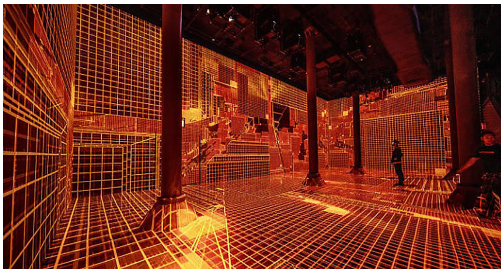

Figure 4. Part of the installation "Unseen", New York, Museum of Modern Art
Source: Timeout (2024)

These examples demonstrate how VR installations can change the experience of visiting museums, making it more interactive, educational, and engaging. Using VR allows viewers not only to see works of art in a new light, but also to immerse themselves in their historical and cultural context. Artists use VR technologies to create new forms of artistic expression that go beyond traditional media. With the help of virtual reality, they can create interactive three-dimensional spaces where viewers can not only contemplate works of art, but also interact with them, change them and influence their development. This allows artists to experiment with new forms of narrative and create dynamic, variable compositions that respond to the actions of the audience (Grau 2002). VR also opens up opportunities for collaboration between artists from different disciplines, helping to create complex, multi-layered art projects.

Virtual reality technologies open up new horizons for contemporary artists, allowing them to create interactive and engaging works of art that engage viewers in unique virtual worlds. Next, the study considers some outstanding examples of the use of VR in contemporary art. Jeffrey Shaw is one of the pioneers in the use of VR technologies in the arts. His work often explores the boundaries between reality and virtuality, inviting viewers to interact with digital spaces. One of the most famous projects by J. Shaw is "The Legible City" (Fig. 5). In this VR installation, viewers can ride a bicycle through three-dimensional virtual cities where buildings are made up of text. Each word represents a piece of history or narrative, allowing viewers to "read" the city while travelling. This project is a great example of interactivity and new forms of storytelling that are possible due to VR technologies.

Figure 5. "The Legible City" by J. Shaw
Source: Jeffreyshawcompendium (2023)

Lauri Anderson, a well-known American artist and musician, also actively uses VR in her works. One of her most famous projects is "Chalkroom" (2017), created in collaboration with Taiwanese artist Hu Chen (Fig. 6). In this VR installation, viewers can move freely around a virtual room whose walls are covered with texts, drawings, and videos. Each element can be explored by interacting with it through body movements and controllers. "Chalkroom" creates a unique interactive experience that combines literature, music, and visual arts. Raphael Lozano-Hemmer is a Mexican media artist who uses VR in his installations to create interactive and personalised experiences. His work "Border Tuner" (2019) is an interactive lighting project that brings together the cities of El Paso and Juarez through VR technologies (Fig. 7). In this installation, participants can communicate with each

other using light rays and sound waves, which gives the impression of a single virtual space separated by a border. It allows exploring issues of identity, separation, and unity through VR.

Figure 6. "Chalkroom" by L. Anderson
Source: Dreamideamachine (2019)

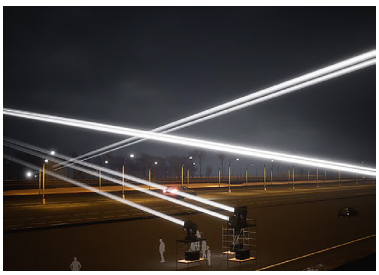

Figure 7. Performance "Border Tuner" by R. Lozano-Hammer
Source: Bordertuner (2019)

Miguel Chevalier is a French artist who specialises in digital art and uses VR technologies to create exciting installations. His project "Extra Natural" (2018) takes viewers to a virtual forest, where they can watch fantastic plants that respond to their movements and interactions (Fig. 8). This installation explores the relationship between nature and technology, offering viewers a new way to interact with nature through virtual reality.

Figure 8. Footage from performance "Extra Natural" by M. Chevalier
Source: Miguel-chevalier (2018)

These examples demonstrate how contemporary artists use VR to create new forms of artistic expression that allow viewers to immerse themselves in virtual worlds and interact with them in new and exciting ways. Exhibitions and performances using VR technologies are becoming increasingly popular, providing viewers with a unique interactive experience. Exhibition organisers use VR to create virtual environments where viewers can interact with exhibits in a new, more immersive way. Performances that include VR allow creating interactive shows where viewers can actively participate in events, changing their course with their actions. This creates a new level of engagement and emotional impact, enhancing the experience of exhibitions and performances. VR also allows organising virtual exhibitions that can be visited from anywhere in the world, expanding access to art and cultural events (Jung *et al.*, 2016).

The Virtual Online Museum of Art (VOMA) is the world's first fully virtual museum which launched to the public in 2020 (Fig. 9). This is a virtual space where works from different eras and artistic trends are presented, collected from famous museums and private collections. Viewers can navigate the halls of the museum, view paintings, sculptures and other exhibits in high resolution, getting additional information about each work through interactive hints. VOMA also offers interactive tours and themed exhibitions that help to better understand art and its context.

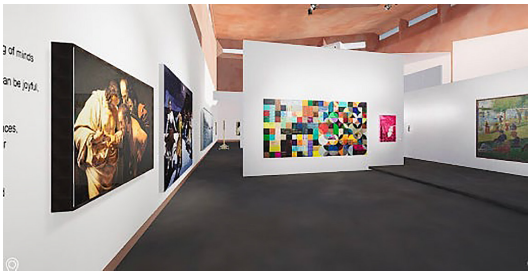

Figure 9. One of the galleries of the VOMA virtual museum
Source: Aislingquigley (2024)

Art Gate VR is a virtual platform for organising art exhibitions and events. It allows artists, galleries, and museums to create virtual exhibition spaces where viewers can view and interact with works of art in a 3D environment (Fig. 10). For example, in 2021, Art Gate VR organised a virtual exhibition "Art in Isolation", which showed the works of artists created during the COVID-19 pandemic. Visitors could view exhibits, listen to audio guides, and even interact with artists in real time through avatars. This gives viewers a unique experience that combines virtual reality with elements of social interaction.

Figure 10. Art Gate VR virtual gallery images
Source: Art Gate (2024)

Acute Art is a platform that collaborates with leading contemporary artists to create virtual and augmented reality (VR and AR) experiences. One of the most famous

projects of Acute Art is "Kaws: Holiday", where the works of the prominent American artist Kaws were presented in the form of giant virtual sculptures located in different cities of the world, available through the AR application (Fig. 11). Acute Art also organised virtual exhibitions where viewers could interact with digital works of art in a VR environment, allowing them to create a unique and immersive experience.

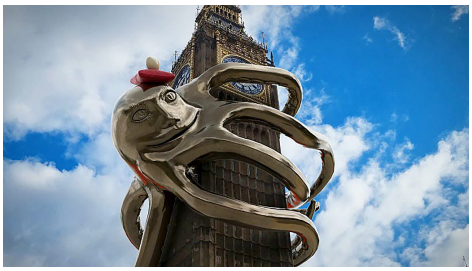

Figure 11. Image of a giant unrealistic sculpture on Big Ben on the Acute Art platform
Source: Acuteart (2024)

The Reality of Augmented Version project was implemented in collaboration with several museums and artists to create virtual exhibitions that are accessible via VR helmets (Fig. 12). One example is "The Brushstroke" exhibition, where visitors can watch the process of creating famous paintings in real time in virtual space. Viewers can see how artists work, interact with them, and even "help" them in the process.

Figure 12. Exhibition of augmented reality paintings
Source: Academyart (2019)

Given these examples, it can be argued that exhibitions and VR galleries can expand the possibilities of art, allowing viewers to interact with works in new and exciting forms, creating a unique experience that is not possible in traditional galleries.

CULTURAL CONTEXT AND ITS ROLE IN INTEGRATING VIRTUAL REALITY INTO CONTEMPORARY ART

Historical background plays a key role in understanding the integration of virtual reality into contemporary art. Throughout history, art has always actively interacted with new technologies, using them to expand the boundaries of creativity and create new forms of expression (Henning, 2006). From the invention of photography and cinema to the digital revolution, every new technology has provided artists with new tools to experiment and innovate. One of the important historical prerequisites for integrating VR into art was the spread of computer graphics and digital technologies in the late 20th century. The advent of computer software for creating three-dimensional models and animations opened up new opportunities for artists who began using these technologies to create digital installations and interactive expositions. These early experiments became the basis for the development of VR in art. The historical background for integrating VR technologies into art includes years of technology development and experimentation with new forms of expression. Studying these prerequisites helps to understand how modern VR technologies have become a logical continuation of the evolution of art, opening up new opportunities for creativity and interaction with the audience.

Social aspects also play an equally important role in the process of integrating virtual reality into contemporary art, since virtual reality can change the ways of social interaction and collective perception of art. Virtual spaces create new opportunities for communication between viewers, allowing them to interact not only with works of art, but also with each other in a virtual environment. This contributes to the establishment of communities where people can exchange opinions, impressions and interpretations, which deepens the understanding and perception of art. One of the key benefits of VR is the ability to create inclusive environments where people with different physical abilities can interact equally with art (Coelho *et al.*, 2012).

Virtual museums and galleries can be accessed by those who do not have the opportunity to visit physical spaces, which contributes to wider audience engagement and increased access to cultural heritage. In addition, VR technologies allow preserving and promoting cultural heritage by creating virtual reconstructions of historical sites and events. This is important for the preservation of culture and history, especially in the context of globalisation and urbanisation, when many cultural sites may be lost or altered. Virtual reconstructions allow preserving them for future generations and making them available to a wide audience around the world.

It is also worth noting that VR can promote cross-cultural dialogue and mutual understanding. Virtual exhibitions dedicated to different cultures and historical eras allow viewers from different countries and cultures to gain access to new knowledge and expand their horizons. This promotes global cultural understanding and cooperation. Thus, the social aspects of integrating virtual reality technologies into contemporary art are important for understanding how technology can promote social interaction, inclusivity, and the preservation of cultural heritage.

Economic factors also play a significant role in the introduction of virtual reality into contemporary art, as VR technologies require significant financial investments both at the development stage and during the implementation of projects. Funding for VR projects in the arts can come from a variety of sources, including government grants, private investment, sponsorship, and crowdfunding. These financial resources are crucial for the development and implementation of VR technologies in the art sector. Commercial potential in art is also an important aspect. Virtual exhibitions, interactive installations,

and other projects can generate revenue through ticket sales, subscriptions, or sponsored events. This opens up new opportunities for artists and cultural institutions, allowing them to monetise their projects and attract additional financial resources for further development. In addition, virtual reality can be used to create commercial products, such as virtual museum tours or interactive art programmes that can be sold on the market. Economic factors also include issues related to the availability of VR technologies to the general public. Reducing the cost of hardware and software makes VR more accessible to artists, museums, and viewers. This contributes to the wider adoption of VR in art and the expansion of the audience that interacts with virtual art projects (Nayar, 2010).

Ethical and moral issues are important aspects of integrating virtual reality into contemporary art, as they relate to the responsibility of artists, curators, and developers to the audience and society at large (Bentkowska-Kafel *et al.*, 2005). One of the main ethical issues is the issue of authorship and ownership of digital works of art. In a virtual environment, it is easy to copy and distribute content, which can lead to copyright infringement. Solving this problem requires the creation of new legal frameworks and mechanisms for protecting intellectual property in the field of VR. Moral aspects also relate to the content of works of art in the field of virtual reality. Artists should consider how their work can affect the emotional and psychological state of the audience. The immersive nature of VR can trigger strong emotional reactions, so it's important to ensure that the content is ethical and doesn't harm users. This is especially true in cases where the works address topics of violence, trauma, or other sensitive issues.

Ethical issues also include issues related to the privacy and security of user data. Using VR can involve collecting and analysing large amounts of personal data, so it is important to ensure that this information is protected and that it is not misused. This requires high standards of security and privacy in the development and use of VR technologies.

CONCLUSIONS

The results of the study emphasise that virtual reality has a significant impact on the emotional perception of art. The immersive effect created by VR allows viewers to feel part of a work of art, which enhances the emotional connection and promotes a deeper understanding of the artistic content. The interactivity of VR technologies allows viewers to actively interact with art, change it and influence its development, which makes the artistic experience dynamic and personalised. Audio-visual effects create multi-layered compositions that profoundly affect the emotional state of the audience, causing strong emotional reactions. In this way, VR opens up new possibilities for artistic expression, allowing artists to experiment with new forms of narrative and create interactive three-dimensional spaces. Collective interaction in VR technologies contributes to the socialisation of artistic experiences, allowing viewers to explore virtual spaces together and share experiences. The use of virtual reality game elements in art installations increases audience engagement and enhances their understanding of artistic concepts. Dynamic content and updated installations create lively, changing artistic experiences that are constantly evolving and adapting, increasing emotional and intellectual interest in art.

Practical examples of the introduction of VR technologies in traditional art demonstrate a variety of approaches and opportunities. Museums use VR to create interactive exhibitions and virtual tours, attracting a wider audience and providing new ways to interact with cultural heritage. Artists use VR technologies to create new forms of artistic expression, allowing viewers to interact with works of art on a deeper level. Exhibitions and performances using VR technologies provide viewers with unique interactive experiences, increasing the level of engagement and expanding access to art events.

The cultural context is important for understanding the integration of virtual reality technologies into contemporary art. Historical background, including the development of digital technologies and interactive installations, has paved the way for the introduction of VR. Social aspects include the impact of VR technologies on social interaction and the preservation of cultural heritage. Economic factors cover the financing of VR projects and their commercial potential, and the availability of technologies to the general public. Ethical and moral issues relate to the authorship, ownership, availability, and confidentiality of data that are critical to ensuring the safe and ethical use of VR in art.

VR technologies have great potential to transform contemporary art, but they also require consideration of important social, economic, and ethical aspects. The main limitations of this study are the subjectivity of assessments, the rapid development of VR technologies, sample selectivity, cultural and regional differences, and insufficient analysis of economic and ethical aspects. Promising areas of further research include empirical analysis of the emotional impact of virtual reality, cross-cultural research, investigation of long-term effects, study of technological innovation, analysis of economic and ethical aspects, and various forms of interactivity and user experience.

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CONFLICT OF INTEREST

None.

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Вплив технологій віртуальної реальності на сприйняття та інтерпретацію сучасного мистецтва

Анотація. Метою дослідження було проаналізувати вплив технологій віртуальної реальності на емоційне сприйняття сучасного мистецтва та визначити, як інтеграція віртуальної реальності змінює традиційні форми художнього вираження. Методологія базувалася на аналізі основних напрямків використання технологій в сучасному мистецтві, а також на вивченні практичних прикладів. У статті розглянуто основи впливу віртуальної реальності на емоційне сприйняття мистецтва, підкреслюючи, як ефект занурення, інтерактивність та аудіовізуальні ефекти створюють нові можливості для художнього вираження. Розглянуто ключову роль інтерактивності у розумінні мистецтва за допомогою технологій віртуальної реальності, включаючи персоналізацію мистецького досвіду, колективну взаємодію, використання ігрових елементів та динамічний контент. Наведено практичні приклади впровадження технологій у традиційне мистецтво, зокрема у музеях, художніх проектах та виставках. Проаналізовано культурний контекст та його роль в інтеграції цифрових інновацій у сучасне мистецтво, враховуючи історичні передумови, соціальні аспекти, економічні фактори та етичні питання. Основні результати дослідження включають: віртуальна реальність значно підсилює емоційний відгук глядачів через ефект занурення, створюючи глибший емоційний зв›язок з мистецьким твором. Інтерактивність дозволяє глядачам активно взаємодіяти з мистецтвом, роблячи досвід більш динамічним та персоналізованим. Практичне впровадження технологій віртуальної реальності у музеях, художніх проектах та виставках демонструє нові способи взаємодії з культурною спадщиною та мистецькими творами. Культурний контекст відіграє важливу роль в інтеграції віртуальної реальності, зокрема історичні, соціальні, економічні та етичні аспекти, які визначають успішність впровадження технологій у мистецтво. Ці результати підкреслюють значний потенціал VR для трансформації сучасного мистецтва, відкриваючи нові горизонти для творчості та залучення глядачів, але також вказують на необхідність врахування важливих економічних та етичних аспектів

Ключові слова: інтерактивність; емоційний вплив; тривимірні простори; культурна спадщина; цифрові технології; інновації у мистецтві