

# Graphic Design Analyses in VR-Based Interactive Experiences: The Void of Philae Project

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## Abstract

This research examines the role of graphic design elements and visual narrative strategies in creating immersive experiences in virtual reality (VR) environments from an applied perspective. While the vast majority of existing VR applications adopt approaches focused on technical accuracy, documentation, or gamification, there is a significant gap in the systematic investigation of graphic design elements such as color, light, composition, and atmosphere. To fill this gap, this study developed a VR project called Void of Philae, inspired by the Temple of Isis on Philae Island in Egypt, and documented the visual design and art direction processes through this project. The research adopts an applied art and design research methodology and follows a systematic process based on the design thinking cycle (explore, define, design, prototype, test, iterate). The main research questions are: (1) How do graphic design elements shape user experience in a VR environment? (2) How do spatial design and environmental storytelling techniques support visual narrative? (3) How can the applied art and design research approach offer a methodological framework for the development of VR projects? The data collection process consists of three main components: systematic documentation of the design and production process, comparative visual analysis, and expert evaluation. The findings demonstrate that in VR environments, color palette plays a critical role in creating emotional atmosphere, lighting in generating spatial depth and a sense of presence, composition in guiding the user, and environmental storytelling techniques in providing an immersive narrative experience. The research positions VR not only as a technology platform but also as a new field of expression for visual arts, and offers a unique methodological framework for the development of VR projects in art and design disciplines.

**Keywords:** Virtual Reality, Graphic Design, Environmental Storytelling, Immersive Experience, Visual Narrative, Applied Arts Research

## INTRODUCTION

The rapid development of virtual reality (VR) technology over the past decade has enabled the emergence of new forms of expression and experiential narrative strategies in art and design disciplines. Particularly in the field of cultural heritage, VR applications have begun to be used not only for the digital

reconstruction of archaeological and historical sites, but also for creating artistic experiences that reinterpret the emotional and aesthetic dimensions of these spaces. However, the vast majority of existing VR applications either adopt an approach focused on technical accuracy and documentation, or emphasize interaction mechanics and gamification elements. This situation creates a gap in the systematic examination of artistic dimensions such as graphic design, visual narrative, and atmosphere creation in VR environments.

This research addresses the processes of visual design and art direction in virtual reality environments from an applied perspective, with the aim of filling this gap. The Void of Philae project, as a VR experience inspired by the Temple of Isis on Philae Island in Egypt, aims to create an immersive visual narrative through the artistic interpretation of a historical site. The project's original contribution lies in its systematic investigation and documentation of how graphic design elements such as color, light, composition, and atmosphere can be utilized in VR environments, rather than focusing on archaeological accuracy or educational content production. This approach positions VR not only as a technology platform, but also as a new field of expression for the visual arts.

The primary objective of the research is to explore methods for establishing an effective visual language in VR environments and to justify the design decisions made in this process within a theoretical framework. Accordingly, the research seeks to answer three main questions: (1) How do graphic design elements (color, light, composition) shape user experience in VR environments? (2) How do spatial design and environmental storytelling techniques support visual narrative in VR? (3) How can the practice-based art and design research approach provide a methodological framework for the development of VR projects? These questions are answered through both a conceptual framework informed by theoretical literature and practical findings obtained from the production process of the Void of Philae project.

The research adopts a practice-based art and design research methodology and follows a systematic process based on the design thinking cycle (explore, define, design, prototype, test, iterate). This approach places the artistic production process itself at the center of the research and foregrounds the principle of "knowing through making." The research process consists of four main components: comprehensive literature review, iterative design and documentation, comparative visual analysis, and expert evaluation. This multi-layered structure aims to generate original knowledge on graphic design and visual narrative in VR environments by establishing a strong dialogue between theoretical foundation and practical application.

### **1.1. Problem Statement and Research Objectives**

Despite the increasingly widespread use of virtual reality technology in the fields of art, design, and cultural heritage, the vast majority of these applications either adopt an approach focused on technical accuracy and documentation, or emphasize interaction mechanics and gamification elements. Issues such as how graphic design elements (color, light, composition, atmosphere) should be utilized in VR environments, the role of visual narrative strategies in creating immersive experiences, and how art

direction processes should be structured in VR projects have not been systematically addressed in the literature and have not been supported by applied research. This section discusses the deficiencies and limitations of existing VR applications in terms of visual design, establishes the significance of this gap for art and design disciplines, and explains how the Void of Philae project aims to address this research problem within this context.

### **1.2. Scope, Limitations, and Expected Contributions of the Research**

Every scientific research is conducted within a specific scope and limitations in order to optimize resource allocation, enable in-depth analysis, and maintain focus on research questions. In line with the specific needs of art and design disciplines, this research focuses on graphic design and visual narrative processes in VR environments, while deliberately excluding technical, historical, and pedagogical dimensions that fall outside this focus. This section systematically explains which elements the research examines in depth, which topics are investigated at a minimal level, and which areas remain outside the scope of the research. Additionally, the methodological and practical limitations of the research, as well as the original contributions it aims to offer to the art, design, and VR literature, are detailed. This clarification strengthens the scientific positioning of the research and provides a realistic framework for interpreting the results.

## **2. CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW**

Understanding visual design and art direction processes in virtual reality environments requires a multidisciplinary theoretical foundation. This research is positioned at the intersection of five fundamental disciplines: graphic design theory, visual narrative and environmental storytelling, immersive technologies and user experience design, digital game art, and virtual architecture. Each discipline illuminates a different dimension of establishing an effective visual language in VR environments and provides a theoretical foundation for the design decisions of the Void of Philae project. While graphic design theory offers principles on how to utilize fundamental elements such as color, light, composition, and visual hierarchy, the visual narrative literature explains how space itself can function as a storyteller. Research on immersive technologies and user experience reveals the specific requirements of VR (presence, immersion, visual comfort) and how these requirements can be integrated into the design process.

This research is based on a practice-based art and design approach positioned at the intersection of different disciplines. The theoretical foundation of the study is a reflective mode of thinking that centers knowledge acquisition through experience and production in the design process. This approach acknowledges that the creative process is not merely aesthetic production, but also a research domain that transforms into knowledge through systematic observation and evaluation. The aim is to make the tacit knowledge formed within design practice visible through observation, documentation, and critical analysis conducted throughout the process. The Void of Philae project has also adopted this method, aiming to develop a new knowledge production model on graphic design and visual narrative in virtual reality environments. The project process has been systematically documented from the conceptual stage to the final product, each design decision has been linked to the conceptual framework, and the obtained

data have been evaluated through holistic analysis.

The literature review was conducted to concretize this conceptual framework and identify theoretical tools that could answer the research questions. The review was carried out through academic databases (Google Scholar, JSTOR, Web of Science, ACM Digital Library), art and design journals (Leonardo, Design Studies, International Journal of Design), conference proceedings (CHI, SIGGRAPH, DiGRA), and industry reports. Additionally, the examination of existing VR art and cultural heritage projects enabled the connection of industry applications with academic literature. The findings obtained from the literature review have been organized under five main themes: (1) Graphic design theory and visual communication in VR, (2) Visual narrative and environmental storytelling strategies, (3) Virtual reality and immersive experience design, (4) Digital game art and level design principles, (5) Lighting design and 3D visualization techniques. This thematic organization guides both the structuring of the theoretical framework and the analysis of the design process of the Void of Philae project.

VR design principles and visual design elements form the foundation of immersive experiences. Baniadam et al. (1) emphasized the critical importance of visual design elements such as color and visual hierarchy in VR design, while revealing that truly immersive experiences must integrate multisensory dimensions such as tactile interaction and olfactory stimuli. Chen et al. (3) stated that VR experience design must significantly diverge from traditional graphical user interface (GUI) principles and demonstrated that early VR device design outcomes cannot be directly applied to new VR interaction interfaces. This finding emphasizes the necessity of developing design approaches specific to VR environments. Chamusca et al. (2) found in their study on the development and validation of design guidelines for VR authoring tools that the lack of standardization creates significant challenges for both users and designers. Similarly, Safikhani et al. (14) examined the lack of clear guidelines and standards for three-dimensional user interfaces (3D UI) and found that this situation leads to diverse and inconsistent interface designs in the literature. Szentirmai (18) investigated the increasing importance of universal design principles in VR development and demonstrated that inclusivity-focused designs provide accessible immersive experiences for users with different abilities.

Cultural heritage visualization is one of the application areas where visual design principles gain particular importance. He et al. (8) investigated the use of VR technologies in the presentation of cultural heritage and examined how user experiences can be enhanced through simple interactive systems. This study emphasizes the role of visual design strategies in reinterpreting historical and cultural spaces in VR environments. Tao et al. (19) investigated the effect of motion tracking quality on perceived realism and user virtual reality, finding that motion tracking quality in head-mounted display (HMD) VR directly determines the realism of interaction with the virtual environment. This finding reveals the impact of technical performance on visual experience quality.

Environmental storytelling emerges as a distinctive narrative approach specific to video games and VR experiences. Jenkins (9) revealed that video games function as complex forms of "environmental

storytelling" and emphasized the capacity of this medium to realize the spatiality of narratives and provide players with immersive narrative experiences (4). Demirbağ-Kaplan and Kaplan (4) investigated the integration of game and storytelling mechanisms in environmental storytelling and found that when the game experience is conceptualized as a hypermedia activity, the integration of game and storytelling enhances individuals' interaction with both narrative content and experience interpretation. The same researchers noted that the immersive quality of environmental storytelling stems from the player's active navigation and interpretation of designed spaces, referring to Jenkins' (9) emphasis that video games provide players with an "immersive narrative experience" through their ability to realize narrative spatiality. Demirbağ-Kaplan and Kaplan (4) also revealed that the interaction of environmental storytelling and spatial narrative facilitates identity construction and reinvention processes for players. Similar to cultural, social, and economic experiences in material reality, they found that narrative experiences in digital virtual contexts help individuals invent and reinvent their identities. They noted that the virtual context of game worlds provides a distinctive advantage: players can explore identity possibilities without being bound by the ideal or actual limitations of existence in material reality.

Sense of presence and immersion are fundamental constructs that determine the quality of VR experiences. Slater (15) conceptualized the sense of presence as the subjective feeling of "being there" despite physical distance and revealed that this constitutes a critical criterion for evaluating the quality and effectiveness of virtual reality systems. Slater et al. (16) stated that immersion is a technical characteristic of VR systems and forms the fundamental ground on which presence experiences are created. Grassini and Laumann (6) found that with the proliferation of VR applications in education, therapy, commercial, and entertainment sectors, measuring and understanding these constructs has gained vital importance. Slater (15) further developed the concept of presence through the distinction between place illusion and plausibility illusion. While place illusion refers to the illusion of being in a place, plausibility illusion concerns the feeling that events occurring in the virtual environment are real and consequential, demonstrating that these illusions together form the basis for realistic behavioral responses in virtual environments. Wienrich et al. (21) investigated that the concept of virtual presence is strongly linked to the overall user experience in VR and found that it functions as a critical indicator of system quality and effectiveness.

Various valid instruments have been developed for measuring the sense of presence. Testón et al. (20) investigated that the Igroup Presence Questionnaire (IPQ) allows for easy assessment of the sense of presence in virtual environments and found that the design of the instrument enables comprehensive evaluation of the sense of presence while also capturing information about other aspects of the VR experience such as realism and interface quality. Ribé-Viñés et al. (13) investigated that the Slater-Usold-Steed Questionnaire (SUS) measures the degree of presence individuals experience in VR environments and demonstrated its applicability to therapeutic VR applications by noting that this instrument has been used in studies examining the effect of multisensory stimulation on fear of heights virtual reality experiences.

User experience evaluation extends beyond presence measurement to encompass multiple dimensions of VR interaction. Young et al. (22) noted that post-task questionnaires distributed immediately after VR scenarios focus on classic usability and user experience and measure student experiences through multiple question items with semantic differential scales. They found that this comprehensive approach captures the pragmatic aspects of usability and the hedonic dimensions of user satisfaction. Souza et al. (17) investigated that user experience in VR encompasses both pragmatic and hedonic aspects. They stated that pragmatic aspects relate to the functional effectiveness of the VR system in supporting task performance, while hedonic aspects relate to the pleasure, engagement, and satisfaction derived from the VR experience. They also emphasized that many people with little or no virtual reality experience encounter confusion and disorientation, and designers need to address this through careful interface design and user experience adaptation. Pawełczyk et al. (12) investigated that the PANAS questionnaire can serve as an effective tool for quantitatively assessing emotional states during sensory interaction in VR experiences and found that it can help illuminate the relationship between specific emotional states such as anxiety or inspiration and the degree of perceived presence in virtual environments.

The realism of virtual environments significantly affects presence and user experience. Greber et al. (7) found that when implicit expectations about how reality should appear are not confirmed in the virtual environment—when the experience does not appear credible—the sense of presence can be disrupted. This finding emphasizes the importance of environmental realism and consistency in maintaining the sense of presence throughout virtual reality experiences. Garces et al. (5) investigated that the realism of virtual reality is extremely important for user experience and found that users partially evaluate positive experiences based on how realistic and credible the virtual environment appears. They noted that the capabilities provided by immersion tools directly enhance user experience by increasing the realism of virtual reality. Morais et al. (10) investigated that selecting characters that closely depict oneself is common in virtual reality practice and found that this personalization of avatar appearance enhances the sense of embodiment and presence in virtual environments.

The potential negative effects of VR experiences are also an important part of user experience evaluation. Pardini et al. (11) investigated that the Virtual Reality Symptom Questionnaire (VRSQ) is an important tool for assessing negative effects related to VR use and noted that this questionnaire captures symptoms such as nausea, dizziness, and disorientation that may occur during or after VR experiences. They emphasized that comprehensive user experience evaluation in VR applications should include assessment of both positive experiences and potential negative effects.

Grassini and Laumann (6) investigated that comprehensive presence assessment typically uses multiple measurement approaches simultaneously and found that physiological measurements, behavioral observations, and subjective questionnaires together provide a more complete picture of presence than any single measurement alone. They noted that this multimodal approach acknowledges that presence manifests at multiple levels of human response. Additionally, they found that systematic review of questionnaire measurements and physiological correlates of presence revealed that questionnaire-based

assessment continues to be the primary approach to presence measurement and that validated instruments are available for researchers. They emphasized that questionnaire selection should be guided by the specific research context and the presence dimensions most relevant to the study.

### **2.1. Graphic Design and Visual Narrative in VR Environments**

Virtual reality requires a rethinking of visual communication and narrative strategies by transporting the fundamental principles of graphic design into a three-dimensional, immersive, and interactive environment. While elements such as color, light, composition, and typography can be controlled within a fixed frame in traditional two-dimensional design disciplines, in VR environments users can move freely, change their perspective, and establish a dynamic relationship with space. This situation presents designers with both new opportunities and new challenges: How is visual hierarchy established? How is the user's attention directed? Through which visual tools are atmosphere and mood created? How does space tell a story through visual elements? This section systematically examines how graphic design elements function in VR environments, the role of visual narrative strategies in creating immersive experiences, and how environmental storytelling techniques integrate with spatial design, through both theoretical literature and current VR applications.

### **2.2. Environmental Storytelling and Related Studies**

Environmental storytelling, which can also be defined as spatial narrative, is an approach in which the story is conveyed not through words, dialogues, or linear plot structures, but through the arrangement of space, the positioning of objects, visual elements, and the atmosphere itself. In this form of narrative, space becomes not merely a stage, but an active element that carries and directs the story. Particularly in digital games and virtual reality experiences, this use of environment offers the audience an opportunity to establish an interactive connection. The user transforms from a mere observer into an active participant who explores, interprets, and becomes part of the narrative. In virtual reality environments, this method creates an even more compelling narrative potential thanks to the multidimensional structure of space and freedom of interaction. Within the scope of this study, the fundamental principles of spatial narrative design and how this approach is materialized in the Void of Philae project are examined through both theoretical framework and application examples.

## **3. METHODOLOGY**

This research adopts a practice-based art and design research approach and places the artistic production process at the center of knowledge generation. The researcher, occupying both a creative and analytical position, documents, justifies, and systematically evaluates design decisions. The Void of Philae project is positioned as a means of generating new knowledge on graphic design and visual narrative in VR environments. The structure of the research is based on the design thinking cycle (explore, define, design, prototype, test, iterate) and ensures that findings obtained at each stage shape the next stage.

The epistemological foundation of the research is based on the concepts of "knowing through making" and "reflective practitioner." Tacit knowledge embedded within design practice is transformed into

explicit knowledge through systematic documentation and reflective thinking. Throughout the production process of the Void of Philae project, visual documentation methods such as mood board studies, concept art iterations, color palette experiments, lighting test renders, and design alternative comparisons were applied, and the theoretical justifications for decisions made at each stage were explained.

The research methodology consists of three fundamental components: (1) Literature review and conceptual framework development - concentrated in the areas of graphic design theory, visual narrative and environmental storytelling, virtual reality and immersive design, digital game art, and lighting design. (2) Applied design process and systematic documentation - consisting of the stages of visual research and concept development, spatial design (form, color, light), visual narrative design and user journey, technical implementation (3D modeling, texturing, Unity integration, VR optimization), and iterative development and A/B testing. (3) Comparative visual analysis and expert evaluation - including comparison of the project with existing VR art and cultural heritage projects across six fundamental dimensions (visual style, color palette, lighting, composition, visual narrative, technical quality) and a focus group study consisting of professionals specialized in VR experience design, graphic design, and game art.

The validity and reliability of the research were ensured through strategies of theoretical grounding (justification of all design decisions with knowledge obtained from literature), systematic documentation (transparency and replicability of the process), and multi-perspective evaluation (reflective evaluation, expert evaluation, comparative analysis). Throughout the research process, ethical standards of art and design research were adhered to, all references were appropriately cited, and the cultural significance of Philae Island was addressed with respect.

### **3.1. Research Design and Scope**

This research adopts a practice-based art and design research design and places the artistic production process at the center of the investigation. The structure of the research is based on the design thinking cycle (explore, define, design, prototype, test, iterate). The Void of Philae project has been documented at every stage from concept development to final product within this cycle, design decisions have been recorded visually and in writing, and findings obtained at each iteration have shaped the next stage.

The scope of the research has been determined in line with the specific needs of art and design disciplines. At the center of the research is the visual design and art direction process: color, light, and composition studies; atmosphere and mood creation; visual narrative strategies and environmental storytelling techniques; user experience design in VR (immersion, presence, visual comfort). Elements excluded from the research scope include: complex game mechanics; programming details and code structure (positioned only as tools that implement design decisions); historical and archaeological accuracy (the project is not a cultural heritage reconstruction but an artistic interpretation); and educational and instructional evaluation.

### **3.2. Design and Production Process (PDCA Cycle)**

The design and production process of the Void of Philae project was structured within the PDCA cycle framework (Plan-Do-Check-Act). In the Plan phase, comprehensive visual research and concept development studies were conducted; mood board studies, reference visual archive creation, clarification of art direction decisions, and preparation of initial sketches were completed. In the Do phase, spatial design (form, composition, color, light), visual narrative design and user journey planning, 3D modeling, texturing, Unity integration, and VR optimization were realized. Each design decision was justified in light of graphic design theory, color psychology, composition principles, and VR user experience literature, and visually documented.

In the Check phase, each design iteration was systematically evaluated and different design alternatives were compared through A/B testing. Color palettes, lighting scenarios (daylight/sunset), composition arrangements, and atmosphere variations were tested, and results were recorded through visual comparison tables. Qualitative data were collected through expert focus group study, semi-structured group discussions, and expert evaluation forms, and evaluated using thematic analysis method. In the Act phase, design iterations were made in line with identified problems and improvement areas, and the process was replanned. At least five major iterations were carried out from the initial prototype to the final version, with visual quality, performance, and user experience improved at each iteration.

### **3.3. Data Collection and Evaluation Methods**

The data collection process was carried out in a multi-layered structure. The primary data source is the systematic documentation of the design and production process: mood board collages, concept drawings, color palette variations, lighting test renders, atmosphere comparisons, 3D modeling stages, performance test results, iteration comparison tables, and A/B test results were recorded visually and in writing. For each design decision, notes were kept on the pre-decision thought process, evaluated alternatives, justifications for the final decision, and theoretical grounding. The secondary data source is the visual materials of VR projects selected for comparative visual analysis (Nefertari: Journey to Eternity, The Blu, Google Arts & Culture VR, Chauvet Cave VR) and existing literature review.

The evaluation process was realized through the integration of three fundamental methods. Reflective evaluation was conducted through the designer-researcher's critical examination of their own design decisions and relating practical experience with theoretical knowledge obtained from literature. Expert evaluation was conducted through a focus group study consisting of professionals specialized in VR experience design, graphic design, and game art; experts directly tested the experience and evaluated it across the dimensions of visual design quality, atmosphere creation, visual narrative effectiveness, user experience, technical implementation, and overall aesthetic success. Comparative analysis was used to determine the position of Void of Philae relative to existing VR projects, reveal its distinctive features, and clarify its original contribution.

## 4. VOID OF PHILAE: DESIGN PROCESS AND FINDINGS

### 4.1. Project Overview and Concept Development

Void of Philae is an applied research project developed to implement and evaluate graphic design solutions in VR-based interactive experiences. The project is designed as a virtual reality experience using first-person perspective (FPS) mechanics, and its primary objective is to examine the effectiveness of visual narrative, spatial design, and atmosphere creation strategies in immersive environments through a concrete example. In this context, the project investigates the role of color, light, composition, and material design principles in creating immersive experiences in VR environments; evaluates the effect of spatial narrative techniques on user experience and emotional connection formation; and aims to provide methodological contribution to art-design research by documenting the design process conducted within the PDCA cycle framework.

Another important objective of the project is to produce an original design study that can be comparatively analyzed with similar VR experiences. In this way, by bridging academic research and applied practice, it demonstrates how theoretical knowledge in the field of VR graphic design can be transformed into concrete design decisions. Testing environmental storytelling strategies and establishing a reference point comparable to industry applications reveals both the academic and practical value of the project.

### 4.2. Visual Design and Technical Implementation

Three-dimensional modeling software was used during the creation of the project, and the relevant site was examined for reference purposes. In this context, an important point to note is that three-dimensional modeling software can exchange files with game engines. Today, there are many popular three-dimensional modeling software programs. Most of these offer the ability to save files with the desired file extension. The modeling phase was initiated using one or several popular software programs such as 3Ds Max, Maya, Blender, and Zbrush.



**Figure 1.** Reference Image of Philae Island

Source:

<https://www.journeytoegypt.com/en/discover-egypt/philae-temple-aswan>



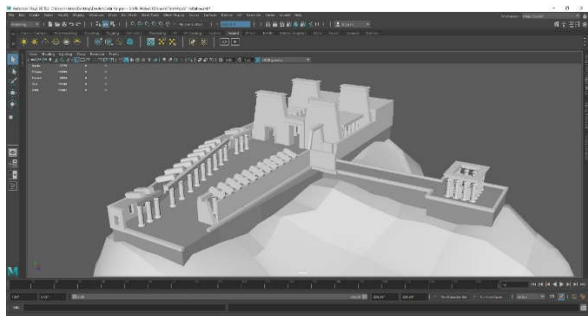
**Figure 2.** Reference Image 2 of Philae Island

Source:

<https://www.journeytoegypt.com/en/discover-egypt/philae-temple-aswan>

In this project, Maya, owned by Autodesk, was preferred as the modeling software. All models used in the project were produced in Maya and transferred to the game engine. Additionally, if additional

modeling is needed, models can be downloaded from the 'Asset Store' available within Unity. Modeling virtual spaces is easier compared to organic models. It begins with the help of primitive objects, and models are created by rearranging their geometry. In some cases, modeling with primitive objects may be insufficient. At this point, it is possible to produce models by transferring two-dimensional drawings to three-dimensional modeling software.

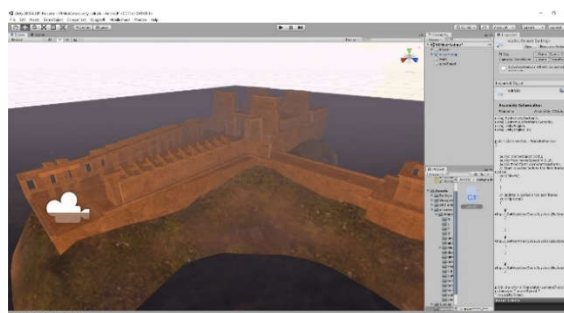
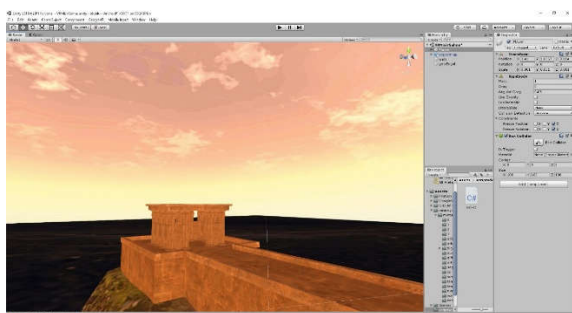


**Figure 3.** Reference-Based Modeling of Philae Island



**Figure 4.** Render Image of Philae Island

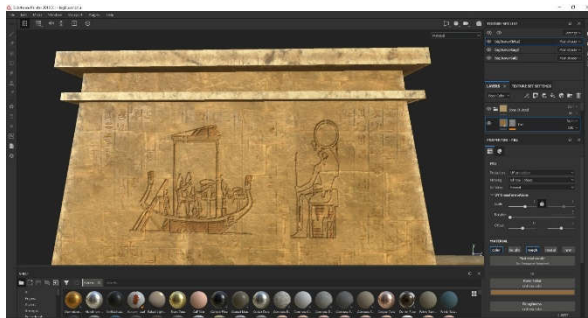
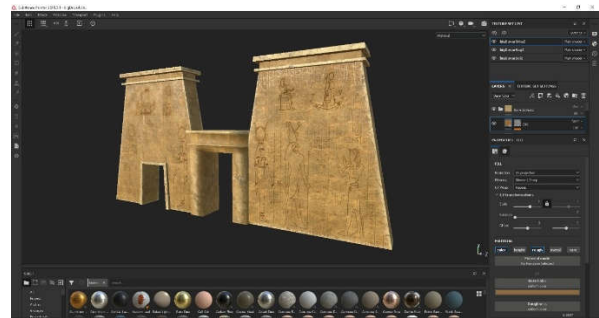
Lighting is performed in various 3D programs for purposes such as rendering. However, when the use of game engines comes into play, lights created in three-dimensional modeling software do not work in the Unity 3D game engine. Therefore, after the model is created and transferred to the scene, the lighting process must be performed in the Unity 3D game engine. The Unity 3D game engine offers various lighting options such as 'Directional Light', 'Point Light', and 'Spotlight'. In the Void of Philae project, 'Directional Light', which follows a path based on imitating sunlight in the real world, was used for the outdoor scene. However, although lights prepared in game engines attempt to imitate characteristics similar to the real world, this simulation is sometimes exceeded. Depending on the created scene, while incoming light illuminates some areas, some remaining areas may remain in darkness. To prevent areas that light cannot illuminate from remaining in darkness, it is possible to prevent such problems by using various light sources with uncertain sources and low intensity. For the created indoor scene, 'Point Light' and 'Spotlight' were used independently from the outdoor space. When creating indoor lighting, illuminating the created enclosed space can be done in a manner similar to illuminating a real house. 'Point Light', which we can call point light, and 'Spotlight', which we can call spot light, were used for room lighting. If dynamic light elements are not used in the created scene, the 'Bake' process prevents recalculation of the scene's lights, reducing the processing load on the user's computer.



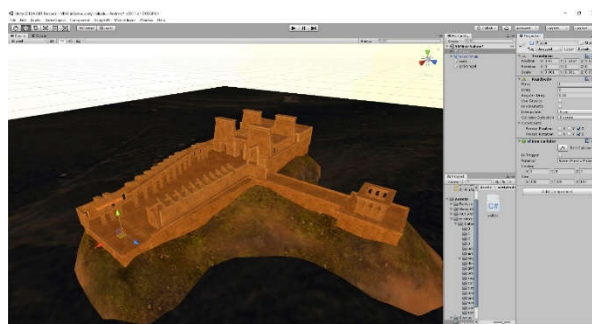
**Figure 6.** Addition of Fog Effect to Game Area

**Figure 5. Addition of Sky and Lighting**

After the completion of the three-dimensional modeling process comes the texturing of spaces and objects. While the texturing process can be performed in the software where modeling is done, special software produced for this purpose can also be used. In addition, the Unity 3D game engine also contains software suitable for creating textures for models. One of the points to be considered during the texturing stage of models is that the size of the material to be used should be low. In this context, if high-dimensional materials are preferred, the desired image can still be obtained, but it results in a longer rendering process. For example, textures chosen for a project that will run in a computer environment can be 1024x1024 px or larger. However, in a project targeting a mobile application, textures of 512x512 px and above cause various performance losses. In the Void of Philae example, Substance Painter, software developed by Allegorithmic solely for texturing and currently being developed by Adobe, was used for the texturing process.

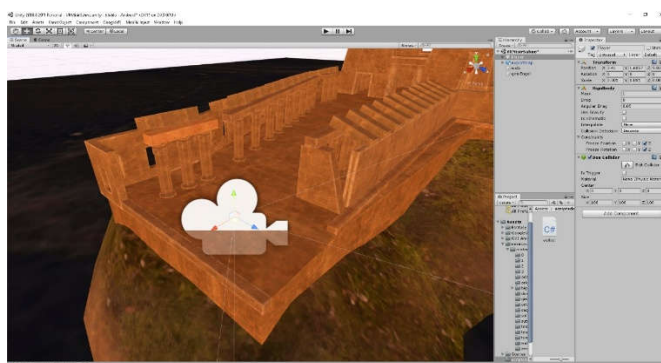
**Figure 7. Texture Process 1 in Substance Painter****Figure 8. Texture Process 2 in Substance Painter**

The three-dimensional objects created for the Void of Philae project were prepared with Maxon software and exported. The 'fbx' extension, which has the most general validity between three-dimensional modeling and game engines, was used for the transfer process. The 'fbx' format was chosen because it can carry model, animation, light, and texture information. Additionally, it allows file exchange between many three-dimensional modeling software and game engines. When three-dimensional models saved as fbx are copied to the (Assets) folder within the Unity 3D game engine, the Unity 3D game engine reveals all information such as models, animations, lights, and textures packaged within the 'fbx'. Through this method, our three-dimensional models were transferred to the Unity 3D scene.

**Figure 9. Transfer of Models to Unity**

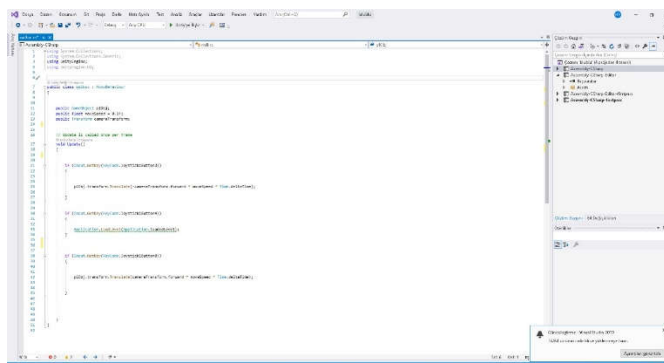
The camera transfers the instantaneous render image of the scene created within the Unity 3D game engine to the user. The transferred image is presented to the user on a two-dimensional monitor screen with a single camera. However, virtual reality cameras work differently, although they appear the same in terms of operation. Virtual reality cameras reflect two instantaneous renders of the image created on the Unity 3D game engine, at the width of the distance between two eyes, to two two-dimensional screens on the wearable headset for the user.

Within the Unity 3D game engine, various plugins suitable for virtual reality devices are available in the Asset Store menu. With the inclusion of device plugins in the project, it is possible to add a virtual reality camera to the scene in a very simple way. During the creation of the Void of Philae Project, the necessary plugins for the product called Cardboard, owned by Google, were downloaded from the Asset Store menu, included in the project, and the next stage was initiated.



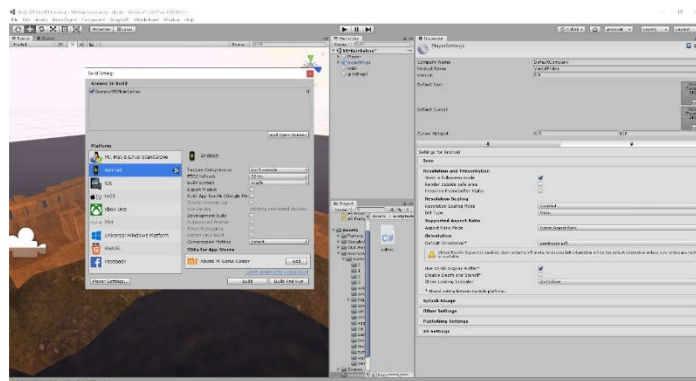
**Figure 10.** Inclusion of Virtual Reality Camera

After placing and lighting the three-dimensional scene within the Unity 3D game engine, the user needs to interact with the environment in the next stage. At the interaction point, the environment cannot interact with users unless any command is given. Therefore, small programs called 'Scripts' are needed within the Unity 3D game engine. Scripts are used to determine how and in what way the user will interact with the environment. Examples of such situations include lights turning on when a room button is pressed or the game starting when the start game button is pressed. Game engines support at least one programming language, and some game engines support multiple programming languages. In the Void of Philae project, the C# programming language was used in the Unity 3D game engine.



**Figure 11.** Example of Scripts Enabling Player Movement

After the completion of the project, in order to make the project available to users, all files and scripts within the project need to be compiled, that is, the 'build' process needs to be performed and published. Today, there are many platforms that appeal to users, such as mobile, computer, game consoles, smart televisions, and web environments. Within the Unity 3D game engine, there are different options that appeal to many platforms. After selecting the necessary platform for compiling the project with the Unity 3D game engine, the project is made ready for compilation by setting the project icon, splash screen, and various software settings. For a virtual reality project to be published on the Unity 3D game engine, the 'Player Settings' panel must be accessed from the Build Settings panel, then the XR Settings panel, and the Virtual Reality Support setting must be checked. With the configuration of other necessary settings, the Void of Philae project has been made ready to meet users.

**Figure 12.** Project Build Screen in Unity

### 4.3. Evaluation Findings and Discussion

The findings obtained throughout the design and production process of the Void of Philae project reveal the effect of graphic design elements on user experience in VR environments from a multidimensional perspective. A/B tests and expert evaluations conducted during the project's iterative development process demonstrated that the color palette plays a critical role in creating emotional atmosphere. Particularly, the sunset scenario using warm tones (golden yellow, orange, reddish brown) created a stronger sense of presence and emotional connection in users compared to the daytime scenario dominated by cool tones (blue, gray, white). This finding aligns with Baniadam et al.'s (1) observations regarding the critical importance of color and visual hierarchy in VR design. Additionally, it was observed that the color palette is not merely an aesthetic choice, but also a tool that directly shapes the psychological relationship the user establishes with the space. The mood board studies and color palette variations prepared during the project's concept development phase enabled systematic documentation of this finding and contributed to the theoretical grounding of design decisions.

The role of lighting strategies in spatial depth perception and immersive experience creation constitutes one of the most important findings of the research. Lighting tests conducted on the Unity 3D game engine revealed that the use of Directional Light provides realistic sunlight simulation in outdoor spaces, but is not sufficient alone. Adding various light sources with uncertain origins and low intensity (ambient light)

to prevent areas that light cannot illuminate from remaining in darkness was effective in increasing visual comfort and preventing user disorientation. In indoor lighting, it was observed that the combination of Point Light and Spotlight yielded successful results in terms of creating spatial hierarchy and directing the user's attention to specific points. These findings are consistent with Souza et al.'s (17) observations regarding the pragmatic and hedonic aspects of VR experience; lighting directly affects both functional effectiveness (pragmatic) and aesthetic satisfaction (hedonic). Additionally, pre-calculating lights through the 'Bake' process provided performance optimization, reducing the processing load on the user's computer and offering a more fluid VR experience.

The application of environmental storytelling techniques in the Void of Philae project concretely demonstrated how space itself can function as a narrative tool. The spatial arrangement designed with inspiration from the historical and cultural context of Philae Island directed the user toward an exploration-based experience rather than a linear narrative. Jenkins' (9) theoretical framework that video games function as forms of "environmental storytelling" guided the project's design process, and the capacity of space to realize narrative spatiality was systematically evaluated. Demirbağ-Kaplan and Kaplan's (4) finding that the immersive quality of environmental storytelling stems from the user's active navigation and interpretation of designed spaces was also confirmed in the Void of Philae experience. Users experienced the space not as passive observers but as active explorers, and this situation strengthened the sense of presence. In expert evaluations, feedback was received that spatial narrative aroused curiosity in users and increased exploration motivation.

The challenges encountered during the technical implementation process and the solutions developed offer important insights into the production process of VR projects. The use of FBX format in file exchange between three-dimensional modeling software (Maya) and game engine (Unity 3D) enabled the integrated transfer of model, animation, light, and texture information. However, the fact that lights created in modeling software do not work in Unity 3D required the lighting process to be redone in the game engine, adding an additional iteration stage to the design process. During the texturing stage, the effect of material dimensions on performance was systematically tested, and 512x512 px resolution was determined to be optimal for mobile VR platforms. Chen et al.'s (3) finding that VR experience design must significantly diverge from traditional graphical user interface principles was also manifested in the technical implementation process of the Void of Philae project. The development of optimization strategies specific to VR environments directly affected the project's user experience quality.

Qualitative data obtained from the expert evaluation process revealed the project's strengths and improvement areas from a multidimensional perspective. The focus group consisting of professionals specialized in VR experience design, graphic design, and game art found the project's visual design quality and atmosphere creation successful, while noting that interaction mechanics were limited and the user journey could contain more variety. Greber et al.'s (7) finding that the sense of presence can be disrupted when implicit expectations about how reality should appear are not confirmed in the virtual environment was also emphasized in expert evaluations. Particularly, while positive feedback was

received regarding the realism and consistency of the space, it was suggested that some details (for example, texture quality and geometric complexity) could be further improved. Garces et al.'s (5) observation that the realism of virtual reality is extremely important for user experience guided the determination of the Void of Philae project's design priorities.

Comparative visual analysis clarified the position of the Void of Philae project relative to existing VR art and cultural heritage projects. Compared to high-budget cultural heritage reconstruction projects such as *Nefertari: Journey to Eternity*, Void of Philae adopted a more artistic and interpretive approach. Compared to purely artistic VR experiences such as *The Blu*, having a historical and cultural context added an additional layer of meaning to the project. He et al.'s (8) findings on the use of VR technologies in the presentation of cultural heritage support Void of Philae's original contribution in this field. The project's distinctive feature is its focus on graphic design elements rather than archaeological accuracy and the systematic documentation of these elements. This approach positions VR not only as a technology platform but also as a new field of expression for the visual arts, and offers an original methodological framework for the development of VR projects in art-design disciplines. The research findings demonstrate that the practice-based art and design research approach is an effective method in the development of VR projects and that the principle of "knowing through making" establishes a strong bridge between theoretical knowledge and practical experience.

## **5. CONCLUSION AND RECOMMENDATIONS**

This research addressed the role of graphic design elements in creating immersive experiences in virtual reality environments from an applied perspective and systematically examined visual narrative, spatial design, and atmosphere creation strategies through the Void of Philae project. The fundamental findings of the research revealed that graphic design elements such as color, light, composition, and material design in VR environments directly shape user experience and that environmental storytelling techniques strengthen spatial narrative. This study, conducted within the framework of practice-based art and design research methodology, developed an original knowledge production model in the field of VR graphic design by establishing a strong dialogue between theoretical knowledge and practical application. The design process structured with the PDCA cycle (Plan-Do-Check-Act) enabled systematic documentation and justification of decisions made at each stage, thus transforming the principle of "knowing through making" into a concrete research framework.

The findings obtained during the research process demonstrated that establishing an effective visual language in VR environments requires a multi-layered approach. It was observed that color palette selection is not merely an aesthetic decision, but also directly affects the user's emotional responses and relationship with the space. The warm and cool color balance used in the Void of Philae project created different atmospheres in different areas of the space, directing the user's attention and establishing visual hierarchy. Lighting strategies strengthened the perception of spatial depth and emphasized dramatic narrative moments. While realistic sunlight simulation was provided in outdoor spaces through the use of Directional Light, a controlled atmosphere was created in indoor spaces with a combination of Point Light

and Spotlight. These findings confirm the critical effect of lighting design on immersive experiences emphasized in the literature and reveal the importance of developing lighting techniques specific to VR environments.

The application of the environmental storytelling approach concretely demonstrated that space itself can function as a narrative tool. The historical and cultural layers of Philae Island were reconstructed through artistic interpretation rather than archaeological accuracy, offering the user an exploration-based experience. The narrative created through spatial arrangements, object placements, and visual cues encouraged active user participation and strengthened the feeling of being part of the story rather than a passive observer. This approach, consistent with the theoretical framework of Jenkins (9) and Demirbağ-Kaplan and Kaplan (4), confirmed that the immersive quality of spatial narrative stems from the user's active navigation and interpretation of designed spaces. Additionally, literature findings that environmental storytelling facilitates identity construction and reinvention processes aligned with the emotional connection users established with the space and personal interpretation processes in the Void of Philae experience.

The challenges encountered during the technical implementation process and the solutions developed revealed critical points to be considered in the production phase of VR projects. The use of FBX format in file exchange between three-dimensional modeling software (Maya) and game engine (Unity 3D) enabled the integrated transfer of model, animation, light, and texture information. The use of Substance Painter in the texturing process allowed for obtaining high-quality visual results, while optimizing texture dimensions prevented performance losses. Particularly, the preference for 512x512 px texture resolution for mobile VR platforms offered a balanced approach between visual quality and performance. Performing the lighting process within Unity 3D and "baking" non-dynamic lights improved user experience by reducing render load. These technical decisions support the findings in the literature that VR design must diverge from traditional graphical user interface principles and emphasize the importance of optimization strategies specific to VR environments.

The comparative visual analysis and expert evaluation processes clarified the position of the Void of Philae project relative to existing VR art and cultural heritage projects. Comparison with reference projects such as Nefertari: Journey to Eternity, The Blu, Google Arts & Culture VR, and Chauvet Cave VR revealed that Void of Philae possesses distinctive features in the dimensions of visual style, color palette, lighting, composition, visual narrative, and technical quality. Particularly, its artistic interpretation-focused approach rather than archaeological accuracy differentiated the project from educational and documentation-oriented VR applications and positioned VR as a visual art expression field. In expert evaluations, positive feedback was received in the dimensions of atmosphere creation and visual narrative effectiveness, while improvement suggestions came regarding technical optimization and user interface design. These findings emphasize the importance of a multi-perspective evaluation approach in practice-based art and design research and demonstrate that the integration of reflective evaluation and expert opinions enhances research quality.

The methodological contribution of the research is that it presents a concrete model of how the practice-based art and design research approach can be structured in VR projects. The integration of the design thinking cycle (explore, define, design, prototype, test, iterate) with the PDCA cycle enabled a systematic and iterative production process. Supporting each design decision with theoretical grounding enabled the transformation of tacit knowledge into explicit knowledge and placed the principle of "knowing through making" within a scientific research framework. Visual documentation methods such as mood board studies, concept art iterations, color palette experiments, lighting test renders, and A/B tests increased the transparency and replicability of the design process. This methodological approach offers an original contribution to how applied research can be structured in art and design disciplines and establishes a reference framework for future research.

The limitations of the research are important points to be considered in interpreting the results. The project was conducted through a single VR experience, and the generalizability of the findings should be tested in different types of VR applications. Conducting user tests with a limited number of expert participants may not reflect the experiences of a broad user base. Due to technical constraints, some design decisions deviating from ideal implementation necessitated compromises between visual quality and performance. Additionally, limiting the research focus to graphic design and visual narrative prevented in-depth examination of other experience dimensions such as interaction mechanics, sound design, and haptic feedback. Despite these limitations, the research achieved original and systematic knowledge production on graphic design and visual narrative in VR environments and established a solid foundation for future studies.

Recommendations for future research offer various opportunities for expanding and deepening the findings of this study. First, comparative examination of the effect of graphic design elements in different types of VR experiences (games, education, therapy, art) will increase the generalizability of findings. Second, experimental studies with large user groups will enable quantitative measurement of user experience dimensions such as sense of presence, immersion, and emotional responses. The use of valid measurement instruments such as the Igroup Presence Questionnaire (IPQ), Slater-Usuh-Steed Questionnaire (SUS), and PANAS will allow systematic evaluation of subjective experiences. Third, the integration of sound design, haptic feedback, and multisensory stimuli with graphic design elements will investigate the potential for creating more holistic immersive experiences. As Baniadam et al. (1) emphasized, integrating multisensory dimensions such as tactile interaction and olfactory stimuli in truly immersive experiences is an important area on which future research can focus. Fourth, the application of AI-supported procedural content generation and real-time adaptive design systems in VR environments will offer opportunities for creating personalized user experiences. Fifth, how VR applications in the field of cultural heritage can establish a balance between artistic interpretation and archaeological accuracy is an important research problem requiring interdisciplinary collaboration. Sixth, applying universal design principles in VR design and creating accessible experiences for users with different abilities will require the development of inclusivity-focused designs, as Szentirmai (18) emphasized. Seventh, developing

standardized guidelines and design principles for VR design will contribute to addressing the lack of standardization identified by Chamusca et al. (2) and Safikhani et al. (14). Finally, how the practice-based art and design research methodology can be adapted in different creative disciplines (digital art, interactive media, game design) will increase methodological diversity and strengthen interdisciplinary dialogue.

In conclusion, this research has made an original contribution to art and design disciplines by bridging theoretical knowledge and practical application on graphic design and visual narrative in VR environments. The Void of Philae project concretely demonstrated that VR is not only a technology platform but also a new field of expression for the visual arts. The practice-based art and design research methodology enabled the creative process to be systematically documented and transformed into a scientific research framework. Future research will explore ways to create more effective, accessible, and aesthetically rich experiences in VR environments by expanding the findings of this study. In today's world where VR technology is rapidly developing and becoming widespread, the importance of systematic research in the fields of graphic design and visual narrative is increasing, and new knowledge production areas are emerging at the intersection of art, design, technology, and user experience disciplines.

## Disclosures

Acknowledgement:None.

Financial Disclosure: The author received no financial support for the research, authorship, and/or publication of this article.

Conflicts of Interest: The author declares no conflicts of interest.

Ethical declaration: This study is based solely on design analysis and does not involve human participants, animals, or sensitive data. The work represents the author's original research and has not been previously published elsewhere. All visual materials were produced by the author, except for two images that are included for reference purposes only and are used with appropriate attribution and/or permission.

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