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Visual Effects in Virtual Space of the Performance Video "Dash" by Virtual Boy Group PLAVE

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ABSTRACT

The K-Pop entertainment industry is currently competing in developing digital visual technology, one of which is the use of Unreal Engine tools by VLAST to create virtual spaces and quality visual effects. Virtual spaces not only function as backgrounds, but also shape the visual character in a show performance. Although digital visual technology is widely used, studies on the use of visual effects in the formation of virtual spaces are still limited. This study aims to analyze the role of visual effects in forming virtual spaces in the performance video 'Dash'. This study uses a descriptive method with a spatial theory approach proposed by Francis D.K. Ching through visual observation of virtual spaces. The analysis is carried out based on visual elements, namely form, shape, color, texture, and light. The results of the study show that there are two types of virtual spaces displayed in the video, the virtual space not only present as a musical narrative but also to support the performance with visual effects such as explosions, sparks, and lighting that are made to resemble a stage. Visual effects play a role in shaping the emotions and visual character of virtual spaces through the visual elements used. This research contributes to interior design and architecture in understanding the formation of virtual spaces in digital entertainment content, and can be a reference in the development of technology-based space design.

Keywords: *Virtual space, visual effects, performance video, virtual idol*

INTRODUCTION

The development of digital technology in the K-Pop entertainment industry has influenced business strategies, fan interactions, content distribution, and increased revenue. K-Pop, originally known for its unique music and choreography, has become known as a diverse entertainment platform that utilizes digital platforms to engage with fans, distribute content, and generate revenue. This digital transformation in the entertainment industry continues to expand, driven by technological advancements and digital trends (Faulkner, 2024). The transformation has shifted industry management from analog to digital, offline to online, from physical albums to music streaming, from audio-based content to visual-based media, and from local providers to global markets. Currently, many Korean singers and idols release their albums simultaneously on both online and offline platforms. This transition from analog to digital has facilitated the broader and more effective global dissemination of K-Pop to fans worldwide. As a result, fans can access such content online through various platforms such as Spotify, YouTube, iTunes, and other digital platforms (Parc & Kim, 2020).

This digital transition has also introduced new technological media such as digital reproduction and holographic projection for music production, stage performances, commercial purposes, and real-time interaction between the virtual and physical worlds (Song et al., 2024). With stage performances that can be accessed online, performances are no longer limited to physical spaces but can also be created digitally. The increasing number of virtual activities in K-Pop idol promotions has encouraged several entertainment companies to invest in advanced technologies, particularly to enhance audio quality and produce visually appealing effects in music videos. The utilization of such technologies has led to the creation of virtual-based content, such as virtual idols.

PLAVE is one of the boy groups that adopts a virtual concept and has recently gained popularity. Behind their avatars are real people who dance, sing, write lyrics, and produce music. The members' movements are reflected in real time, allowing live broadcasts without post-production processes (Eun, 2024). The boy group PLAVE consists of five digital avatars (Noah, Yejun, Hamin, Eunho, and Bamby) who debuted in 2023 under VLAST Entertainment. VLAST developed PLAVE using Unreal Engine technology. This technology enables real-time rendering, produces high-quality visuals, is easily integrated with motion capture systems, and can be used for live performances. VLAST recognized the potential of Unreal Engine early on to create experiences driven by virtual humans. Therefore, they seek to utilize Unreal Engine technology to generate visual effects for both cinematic content and live performances of PLAVE (VLAST, 2025).

Unreal Engine is a game engine widely used in film and game production due to its real-time rendering capabilities, which allow scenes to be created and visualized efficiently. This technology also serves as one of the tools used to produce high-quality visual effects (Haningtyas, 2024). The visual effects created may include virtual environments (such as landscapes, trees, sky lighting, clouds, and water), animated characters, lighting, materials, and simulation effects (such as particle effects, cloth simulation, physical destruction simulation, and hair strand effects) (VLAST, 2025). Visual effects play a crucial role in film and animation production as one of the major factors that help build emotional engagement. They are created using various techniques, including the use of software or plugins as a medium for conveying emotions and strengthening the depiction of atmosphere (Kristanto & Angelina, 2016).

In the context of visual effects, the performance video 'Dash' performed by PLAVE is one example of a music video whose background setting is entirely created digitally. The members (Noah, Yejun, Hamin, Eunho, and Bamby) perform the song 'Dash' by singing and dancing within a virtual space designed to resemble a stage performance. The stage setting is digitally created using Unreal Engine, resulting in a virtual space and visual effects that support the overall performance quality. According to Isfiaty and Shaleh (2023), virtual space is created through digital media and presented through audiovisual means, allowing users to experience and engage in activities within the space in order to obtain a different spatial experience.

Although virtual space does not exist physically, it still displays spatial elements similar to those found in interior spaces, such as floor planes, wall boundaries, ceiling planes, and supporting spatial elements such as openings. According to Ching and Binggeli (2018), space is formed by three planes: floor, walls, and ceiling. These three planes are sufficient to form what is referred to as an empty space (void). Meanwhile, supporting elements such as openings (windows and doors), stairs, and furniture to fill the space, transforming it into a solid space. Spatial elements are also formed through visual elements, including form, shape, color, texture, and lighting. These elements are interconnected, beginning with points forming lines, lines forming planes, planes forming volumetric forms, and forms eventually creating space.

Previous research has been analyzed from various perspectives. Research by Damar Rizky Nuranda et al. (2023) discusses the concept of digital alter egos in the group Aespa, focusing on fans responses as information data. Research by N.Z. Singh and S.R. Rajhev (2025) also examines virtual space in VR technology as an emotional experience for users. Another study by Yusuf Indarta et al. (2024) discusses innovations in virtual space design in the metaverse, focusing on enhancing user experience through the integration of technology and digital aesthetics. Meanwhile, research by Ferro Yudistira and Ratu Baina (2022) examines the mediation of virtual space through the concepts of framing and presence, while research by So-Young Jang et al. (2023) discusses virtual space as a narrative space in VR experiences. Although some of these studies discuss virtual space and digital media, most research focuses on aspects of user experience and user interaction within digital media. Studies specifically addressing the role of visual effects in shaping spatial elements in digital content, particularly virtual idol-based video performances, are relatively limited. This research serves as a complement to previous research, which focuses on analyzing visual effects in

forming virtual space through visual elements such as form, shape, color, texture, and lighting in the video performance Dash by PLAVE.

Currently, the K-Pop entertainment industry is competing to enhance its digital visual technology, one example being VLAST through the use of Unreal Engine. The utilization of this technology enables the creation of high-quality virtual spaces and visual effects. In the performance video "Dash," the virtual space does not merely function as a visual background but also plays a role in constructing a spatial atmosphere that influences the audience's experience of the performance. Although digital technology has been widely utilized in the entertainment industry, studies examining the use of visual effects in shaping virtual spaces within digital entertainment content remain relatively limited. Therefore, this study aims to analyze the role of visual effects in shaping the atmosphere of virtual space, particularly in the performance video "Dash" performed by PLAVE.

LITERATURE REVIEW

The development of digital technology in the entertainment industry has driven the emergence of new media as entertainment content. As more content is accessed online, more media and facilities are created to access it (Parc & Kim, 2020). Virtual space has become a new medium in the K-Pop entertainment industry, including show entertainment and music videos. Virtual space no longer serves merely as a visual backdrop but also plays a role in shaping the audience's experience and perception of a performance. In this context, visual effects also play a crucial role in building the atmosphere, depth, and character of the space being presented.

Visual effects more commonly known as VFX, is a computerized process in which images or object models are created and manipulated, involving the integration of digital effects footage and computer-generated special effects to create a virtual environment (Murdaningtyas et al., 2024). Visual effects are a crucial element in film, animation, and video production, it playing a significant role in creating emotion. Visual effects are created using software or plugins with various techniques (Kristanto & Angelina, 2016). Here are some visual effects techniques: CGI, green screen, motion capture, miniatures, matte painting, practical effects, and digital compositing.

One of the tools often used to create visual effects is Unreal Engine. Unreal Engine is a game engine that is often used in film and game production because its real-time rendering capabilities are needed to create scenes as a whole (Haningtyas, 2024). Additionally, it excels in processing high-quality graphics, realistic models, and user-friendly interfaces for those less familiar with programming (Fernandez & Sutopo, 2023). Some of the visual effects that can be created include virtual worlds (landscapes, trees, sky lighting, clouds, and water), animated characters, lighting, materials, and simulation effects (particles, cloth simulation, physical destruction simulation, and hair strand effects) (VLAST, 2025).

Spatial Spaces Theory

Creating a virtual space involves digital technology. A virtual space is a space that resembles the real world, created digitally, allowing users to engage in specific activities with the goal of experiencing a space that differs from conventional spaces (Isfiaty & Shaleh, 2023). Meanwhile, interior spaces in the real world are designed to meet basic human needs as a safe and comfortable shelter and protection, both physically and mentally. Therefore, interior spaces can influence human mood and emotions, based on the imagery created by the design (Wicaksono & Tisnawati, 2014). Francis D.K. Ching (2018) put forward the theory od space, that interior space is formed from several elements that form space, namely the floor, walls, and ceiling. These three elements surround the interior space, thus clarifying the boundaries of the space and separating each space. These spatial elements are also composed of several visual elements:

a. Form

Form refers to the form or structure of an object. A point is the source of all shapes. When a point moves, it leaves a line trail. Similarly, when a line shifts direction, it forms a plane or two-dimensional element.

b. Shape

Shape is the main way we distinguish one shape from another. Shape can refer to the contour of a line, the outer edge of a shape, or the boundary of a three-dimensional mass. There are several categories of shapes, namely natural, non-objective, and geometric. Shapes have significant surface qualities such as material, texture, and pattern.

c. Color

Color, like shape and texture, is a visual element that can be attached to all shapes. The colors seen on objects come from light that illuminates and reveals shapes and spaces.

d. Texture

Texture is a specific quality of a surface that results from its three-dimensional structure. Texture is most often used to describe the smoothness or roughness of a surface. There are two types of texture: tactile texture, which is real and can be felt by touch, and visual texture, which can only be seen by the eye.

e. Light

Lighting refers to both natural and artificial lighting. Natural lighting comes from the sun, while artificial lighting comes from lamps. With lighting, visual elements can be seen clearly. This is similar to texture and color.

These visual elements combine to form objects and spaces. Humans acquire perception through the interaction between objects and their senses. Phenomenological philosopher Merleau-Ponty stated that perception is created from a holistic experience involving the senses, emotions, an d interactions (Pallasmaa, 2005). In interior spaces, perception is shaped by the influence of design elements such as form, shape, color, texture, and light.

Table 1: Review of existing literature and research gaps :

No	Author	Research Object	Method	Results	Research Gap
1	Damar Rizky Nuranda, Mashita Phitaloka Fandia Purwaningtyas (2023)	The concept of a digital alter ego in the group Aespa	Qualitative	Fans still interpret "ae" rationally, they consider "ae" as an unreal image of the members and only made for entertainment.	This research was conducted using qualitative methods and focused more on fan responses as informants.
2	Singh, N.Z., Rajhev, S.R. (2025)	Mumbai City Architecture	Qualitative with a phenomenological approach	Virtual space in VR technology not only functions as a design visualization tool, but also becomes an emotional and imaginative experience space for users and encourages them to understand and make decisions in the interior design process.	This research describes the user experience of virtual space, not the analysis of virtual space.
3	Yusuf Indarta, Hany Sulistiani, Heru Jusuf, Emil Suryana (2024)	Virtual space design in the Metaverse	Systematic review	This research shows that the integration of advanced technology and aesthetic design can improve user experience, educational engagement, marketing effectiveness, and business innovation.	This research discusses virtual space innovation to enhance user experience.
4	Ferro Yudistira, Ratu Baina (2022)	Mediation of space in virtual environments	Qualitative interpretative	This study argues that virtual space is formed from the relationship between real-world actors (presence) and the virtual world mediated by technology (framing).	Focuses on strategies for framing virtual environments on screen to build engagement with actors in real

					environments.
5	So-Youn Jang, Jisu Park, Maria Engberg, Blair MacIntyre, Jay D. Bolter (2023)	VR as a narrative space	Qualitative	This research reveals that users can engage with narrative flow in virtual spaces such as galleries and amphitheaters in VR.	This research discusses virtual space as a narrative space and user experience.

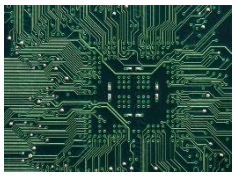
Based on previous research, it can be concluded that virtual space has been extensively studied from various perspectives, such as user experience, design in the metaverse, and as a narrative space in digital environments. Some researchers have also discussed how virtual technology shapes the interaction between users and space. However, most of this research still focuses on aspects of user experience, perception, and conceptual approaches to virtual space. Therefore, this study focuses on analyzing virtual space and how visual effects are applied to it.

METHODOLOGY

This study uses a descriptive method with a spatial theory analysis approach to analyze virtual space in the video. The description focuses on visual effects and their influence on virtual space in the Performance Video 'Dash'. This method helps researchers describe and depict the state of virtual space in the Performance Video 'Dash'. The spatial theory used will explain how a space is formed through space-forming elements, as well as how visual elements arrange the forming elements and complete the space. Space is formed from several planes (shape) called space-forming elements, namely the floor, walls, and ceiling. Meanwhile, space-forming elements are also formed from several unified visual elements, namely form, shape, color, texture, and lighting (Ching & Binggeli, 2018). Therefore, this study will be analyzed based on spatial theory by analyzing each visual element to examine the visual effects on virtual space. The analysis is carried out by observing how space-forming elements such as the floor, walls, and ceiling are represented in the virtual space in the video. Furthermore, this research also analyzed visual elements such as form, shape, color, texture, and lighting that appear as visual effects. Each element was then analyzed to determine how visual effects contribute to shaping the atmosphere and ambiance within the virtual space.

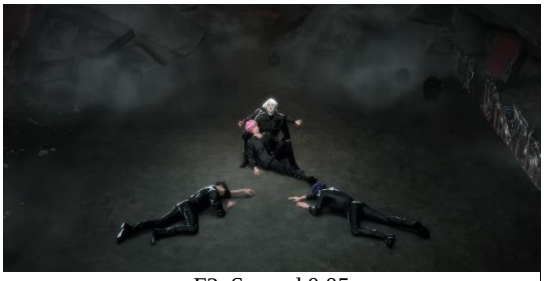
In the Dash video performance presented by PLAVE, the space used is entirely a virtual space created digitally using the Unreal Engine. A virtual space is a space created digitally and then presented and displayed with audiovisuals (Isfiaty & Shaleh, 2023). Although not physically present, the virtual space still displays elements that form a space such as floors, walls, and ceilings, and is supported by visual elements such as form, shape, color, texture, and lighting that form a space (Ching & Binggeli, 2018). Unreal Engine itself is the game engine used by VLAST to develop PLAVE and its contents. Unreal Engine has several features such as creating a virtual world (landscapes, trees, sky lighting, clouds, and water), animated characters, lighting, materials, and simulation effects (particles, cloth simulation, physical destruction simulation, and hair strand effects) (VLAST, 2025). The following will describe the visual effects present in the performance video ‘Dash’ and how the virtual space looks overall

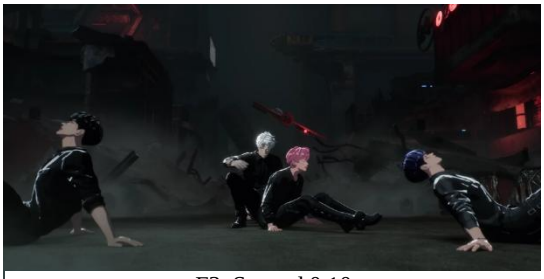
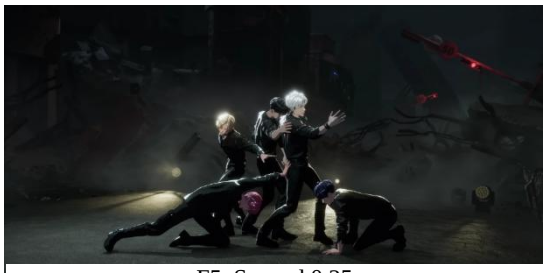
Table 2: Virtual space analysis

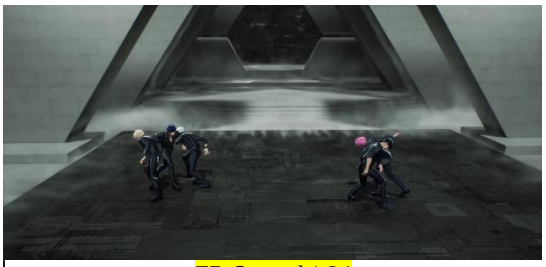
No	Virtual Space	Visual Element Analysis
1		• Form & Shape: The shape of this space is irregular, the area around the stage is filled with chunks of collapsed buildings. • Color  • Texture Cracked concrete  • Light The lighting uses artificial lighting on the background, applied to traffic lights and building signs, with a dominant red color. Additionally, there are uneven cool light spotlights shining from above the stage.
2		• Form & Shape: Dominated by simple geometric shapes with large triangular shapes repeating from small to large. • Color  • Texture Electronic circuit (floor)  Plat metal (walls)  • Light

		Artificial lighting with cool light color evenly from above and behind the stage.

Table 3: Explanation of visual effects

No	Frame	Visual Effects & Explanation
1	 F1. Second 0.00	virtual world with a destroyed urban landscape, animated characters, simulated smoke effects, materials, and lighting. A smoke effect spreads around the performance area, creating a visually enclosed space. The use of smoke enhances the visuals and helps clarify the collapsed space without requiring direct explanation.
2	 F2. Second 0.05	A virtual world with a cracked streetscape, animated characters, materials, and smoke simulation effects. The chaotic and tense state of the city, characterized by visual elements of collapsed buildings, irregular placement of debris, and rough materials such as cracks in the roads.

3	 F3. Second 0.10	Ruin landscape, lighting, materials, animated characters, and smoke simulation effects. The lighting in this setting uses red as the dominant color. This red lighting is applied to collapsed buildings, damaged billboards, building signage, and fallen traffic lights.
4	 F4. Second 1.03	Lighting, materials, animated characters, and smoke simulation effects. The red lighting also became a special visual effect during the rap section, where the entire stage was colored red as if it were illuminated by emergency lights.
5	 F5. Second 0.25	Lighting, materials, animated characters, and smoke simulation effects. In addition to backlighting, there are also stage lights. These are follow-spot lights, provided and placed behind the performance area. These lights change and move according to the members' choreography, much like spotlights on a stage.
6	 F6. Second 0.36	Virtual space with more structured buildings, animated characters, smoke simulation effects, lighting, materials. The building's predominance of dark monochrome colors and metallic materials creates a sense of coldness and tension, as if nothing is right. The neat and crisp visuals of this space actually create a sense of pressure and stiffness.

7	 F7. Second 1.24	Smoke simulation effects, materials, animated characters, and lighting. The shapes displayed on the floor resemble digital circuitry, asymmetrical and random, yet powerful and assertive. This pattern reinforces the futuristic atmosphere of the space, reflecting both the imagery and the song's concept.

CONCLUSION AND RECOMMENDATION

The visual effects displayed in a video play a crucial role in shaping the appearance of a virtual space, particularly in the performance setting. The performance video Dash, popularized by PLAVE, fully utilizes digital technology to create a virtual space as a backdrop. The analysis revealed two main types of virtual space: an outdoor space, an urban landscape with complex visual compositions, and an indoor space with structured and controlled geometric shapes. The main findings of this study indicate that visual effects play a role in shaping the visual character of a space through the processing of visual elements such as shape, plane, color, texture, and lighting. Each space displays a different configuration of visual elements, resulting in a distinct visual character of the space without relying on real physical elements.

The implications of this study indicate that, in the context of digital interior design, visual effects can be used as an approach to shaping virtual space through the manipulation of visual elements. This opens up opportunities for the development of digital technology-based spatial design, particularly in creative industries such as entertainment and digital media. Based on these findings, this study recommends that the development of virtual space in digital content should pay greater attention to the processing of visual elements as the basis for spatial formation. In addition, further research is recommended to examine other aspects such as user perception or spatial experience in more depth to complement the study of virtual space.

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