# 3D Computer Game Design of the Palette Knight Inspired by the Impressionistic Artistic Style

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## Abstract

Many impressionist paintings capture the ephemeral nature of life and the ephemeral experience of human existence. Artists of the impressionist movement sought to convey these fleeting moments through rapid brush strokes, vibrant colours, and an emphasis on atmosphere. This study aims to explore impressionist art and use these insights to design a 3D game environment within Unreal Engine 5, aiming to create an immersive and interactive world that reflects the aesthetic and emotional characteristics of late 19th-century French art by translating impressionist techniques and themes into a digital format. The game will provide players with a new experience of impressionism in motion, allowing them to actively engage and interpret this art form. This study approach involves integrating online data collection and references to academic research, supplemented by resources from the Naresuan University Library, to ensure that the design is insightful and contextualized. This study not only explores the transformative potential of game environments as spaces for artistic expression, but also aims to promote interactive learning experiences where players engage with art and culture. This project aims to define new frontiers in the depiction of historical art trends by promoting active participation and interpretation of impressionistic art through interactive media, combining both education and entertainment.

**Keywords:** Impressionist paintings, 3D game, Unreal Engine 5, Game Environments

## Introduction

Impressionism, a revolutionary art movement originating in late 19th-century France, is renowned for its focus on capturing ephemeral moments, emphasizing the transient qualities of light, colour, and atmosphere. Unlike earlier art forms that focused on meticulous realism, Impressionist painters embraced a loose, expressive style characterized by quick, visible brushstrokes, soft colour transitions, and an emphasis on natural lighting. Artists like Claude Monet, Pierre-Auguste Renoir, and Edgar Degas often painted outdoors, immersing themselves directly in nature to portray scenes as they appeared in a given moment. They pioneered the use of “brush strokes,” where distinct colours were applied side by side without blending, creating an optical mixing effect that gives the viewer a dynamic visual experience when viewed from afar. However, when viewed up close, these paintings may be seen to consist of intricate layers of individual colours, creating a profound interplay between clarity and ambiguity, detail and naturalness.

On the other hand, video games, which are designed specifically for entertainment, provide a powerful interactive medium that promotes creativity, increases adaptability, and builds problem-solving and language skills. Psychological research highlights the potential for video games to improve mood, reduce stress, and provide therapeutic benefits such as lowering the heart rate and promoting relaxation. Video games have been used as a therapeutic tool for over a decade to help relieve anxiety and improve mental health outcomes (Geico, 2022). The concept of "success" in gaming also increases players' motivation and engagement, with overcoming challenges providing a sense of accomplishment. This "success cycle" keeps players immersed, allowing them to escape into an alternative reality that rewards effort, skill, and creativity.

Bringing Impressionism to a 3D game environment in Unreal Engine 5 offers a unique opportunity to enhance the experiential quality of both the art style and the game medium. Within an Impressionist-inspired virtual world, players will encounter beautiful natural scenes filled with intense colours and shifting light, similar to the aesthetics seen in classical Impressionist paintings. Using Unreal Engine's advanced lighting and rendering capabilities, it is possible to simulate the surreal light effects seen in the works of Monet or Renoir, creating the atmosphere of a misty morning, a golden sunset, or a sparkling reflection. The game environment will feature multiple times of day, changing weather conditions, and realistic environmental interactions, reflecting the Impressionism's emphasis on capturing different moods and moments in nature.

The gameplay design allows players to interactively explore these environments, allowing them to move around, discover hidden details, and perceive the colours and textures of the scenes up close, similar to viewing an Impressionist painting. Each scene is created with an emphasis on layering and depth of colour, providing varying perspectives depending on the player's distance and perspective, mimicking the brushstroke effects and "cracking" techniques of Impressionist art. Through exploration, players may encounter environmental sounds, historical narratives, or poetic reflections on life and nature, allowing them to engage in an Impressionist-inspired experience that blurs the lines between art and reality.

This project's objective transcends traditional gaming by merging Impressionist aesthetics with interactive digital environments. By positioning the player as an active participant rather than a passive observer, the game promotes not only entertainment but also cultural and educational engagement. Players will interpret art through their own choices and actions within the game, creating a personalized connection to the art movement's principles. This type of immersive experience reimagines how historical art movements can be integrated with modern technology, providing a unique avenue for cultural appreciation and art education in an interactive format. It invites players to not only engage with the art but also to interpret it, fostering a deeper appreciation for Impressionism's exploration of fleeting beauty, human emotion, and the ephemeral nature of existence.

## Methods and Materials

The design of a 3D Game Based on Impressionist Art: The Colours of the Knight, aims to create a game that combines the immersive qualities of 3D gaming with the aesthetic and technical characteristics of Impressionist art. The project explores how elements of Impressionism—particularly its distinctive use of colour, light, and brushstroke techniques—can be adapted into a digital game format to create an interactive experience that simultaneously functions as an artistic expression. By doing so, this study seeks to establish a new paradigm in game design that integrates historical art styles, enabling players to engage with and interpret Impressionist art in a novel, interactive way.

The research is organized into three structured phases to ensure a clear and systematic approach to achieving the project's objectives, enhancing both the researcher's comprehension and providing a framework for others who may study or develop similar concepts. Each phase builds upon the preceding one, forming a cohesive process that aligns with the goals of integrating Impressionist principles into game design:

**Phase 1: In-Depth Study of Impressionism**

In the first phase, the research focuses on the foundational principles of Impressionism, which emerged in the late 19th century as a movement that aimed to capture the transient effects of light and colour in a naturalistic yet expressive style. This phase involves a detailed examination of Impressionist techniques, such as rapid brushstrokes, vibrant and unmixed colours, and atmospheric lighting. These elements will inform the visual style and artistic direction of the game. Resources include art historical texts, analyses of Impressionist work by artists like Monet, Renoir, and Degas, and studies on how these artists depicted movement, time of day, and emotional tone in their landscapes and figures (as shown in Figure 1). The goal of this phase is to distill the essence of Impressionism into game-ready concepts, identifying the visual and atmospheric techniques that can be adapted into a digital format to evoke the Impressionist experience. Establishing connections involves taking content within a specific scope and further developing it in terms of content and plot structure. This process includes generating new interpretations of key issues or intriguing problems, which are then listed to assist in structuring the narrative framework. By identifying and expanding on these connections, a more nuanced and coherent storyline can be developed, allowing for a deeper exploration of the themes and facilitating a fresh perspective on the topic at hand.


**Figure 1** Game Conceptual Art

Identifying key themes that can be adapted to fit the characteristics of the chosen medium, creating conditions for problem-solving while considering the qualities of Impressionist art. This involves tailoring elements to reflect the movement's emphasis on light, colour, and atmosphere, allowing the medium to convey these qualities effectively. Through this approach, solutions are crafted to align with the Impressionist style, addressing challenges in a way that preserves the aesthetic and emotional essence of the art form.

**Phase 2: Design of Game Elements – Characters, Enemies, Environments, and Objects**

The design scope for this project, intended for further application and adaptation, includes the following elements necessary for initial game development:

*3D Character Models:* A total of four characters model, including the player character and three boss characters.

*Boss and Enemy Animations:* Ten distinct animations covering idle, walking, and attack motions for both bosses and regular enemies.

*3D Item Models:* Four unique 3D item models.

*3D Environment Models:* Three distinct 3D scenes, totaling 24 assets for the game world.

*Puzzle Mechanisms:* Three types of puzzles to advance through levels.

*Player Animations:* Ten animations for the player character, including walking, idle, running, turning, jumping special attack, and standard attack moves (Figure 2).

*Cutscene Animations:* Four additional animations triggered during cutscenes, specifically for actions involving the acquisition of special abilities.

This design framework outlines the foundational assets and mechanics for the game, providing a clear and comprehensive structure to guide initial development efforts.


**Figure 2** Player Character Conceptual Design

**Characters**: The player character and supporting figures are designed with an Impressionist influence in their colour schemes, textures, and visual details. Techniques such as layering colours and mimicking brushstrokes are explored to create characters that feel painterly, almost as if stepping out from an Impressionist canvas. The player should consider the character's weapon style and distinctive features to ensure they are memorable, iconic and instantly recognizable as part of the game. Drawing inspiration from the birth period of Impressionism, the character design can incorporate the style of a musketeer wielding a one-handed sword, blending this historical influence with an artistic flair. To add depth and personality, character traits should be inspired by attributes typically associated with their profession, making them more relatable and engaging (as shown in Figure 3).

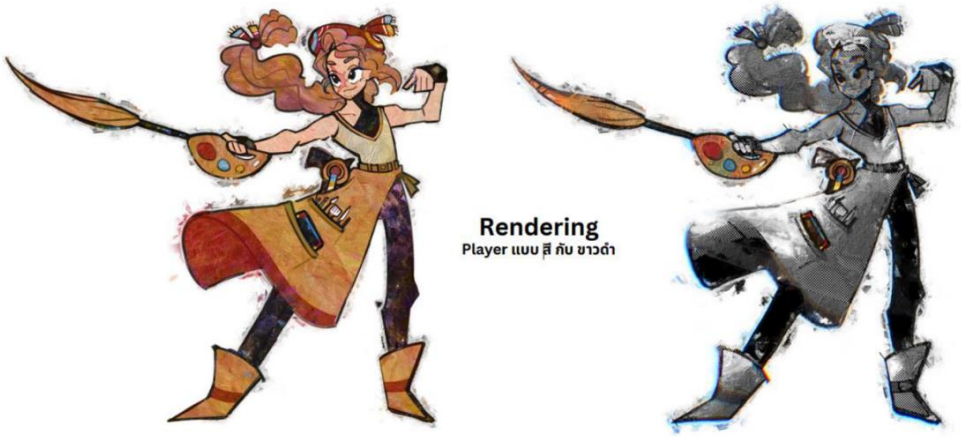


**Figure 3** Player Character Design

The weapon design should reflect the character's role and profession, aligning with the artistic theme. For instance, the sword could be modified to resemble a paintbrush, and palette which could be incorporated, reinforcing the Impressionist-inspired aesthetic and creating a unique and cohesive design that ties directly to the game's artistic identity.

**Enemies:** Enemy characters are similarly crafted to fit within this art style, with their appearances contributing to the game's atmosphere. Each enemy type is designed not only for functional gameplay purposes but also as an extension of the game's artistic direction, ensuring cohesion in visual style and gameplay interaction. The design will encompass three distinct enemy types, each corresponding to different levels of difficulty to progressively increase the game's challenge. For the enemy design, research on art preservation methods will serve as a basis, with common threats to paintings, such as rodents, insects, and mould, reimagined as antagonistic entities within the game. These creatures symbolize natural decay processes and threats to artworks, transforming them into dynamic obstacles for the player. Each enemy type will embody unique behaviours and visual elements to align with its real-world counterpart, adding depth to the game's theme and creating a layered challenge that reflects the hazards faced by Impressionist art over time (as shown in Figure 4).

**Figure 4** Enemies Character Design

**Environment and Objects:** The game world is populated with Impressionist-inspired landscapes, such as sun-dappled forests, foggy lakes, and vibrant cityscapes. Objects within the environment, including interactive elements, are crafted to maintain visual harmony, employing Impressionist colour theory and lighting techniques to establish a cohesive world. Each location in the game reflects the dynamic qualities of light and colour as found in Impressionist works, with attention to detail that brings an immersive, atmospheric quality to the gameplay experience. The selection of locations for the game is designed to align with the era of Impressionist art, focusing on European-style homes and outdoor scenes that capture the interplay of sunlight. These environments reflect the characteristic settings of Impressionist works, as artists frequently chose to create their masterpieces in natural light. By selecting open-air locations, the game evokes the same atmosphere that inspired Impressionist painters (as shown in Figure 5).

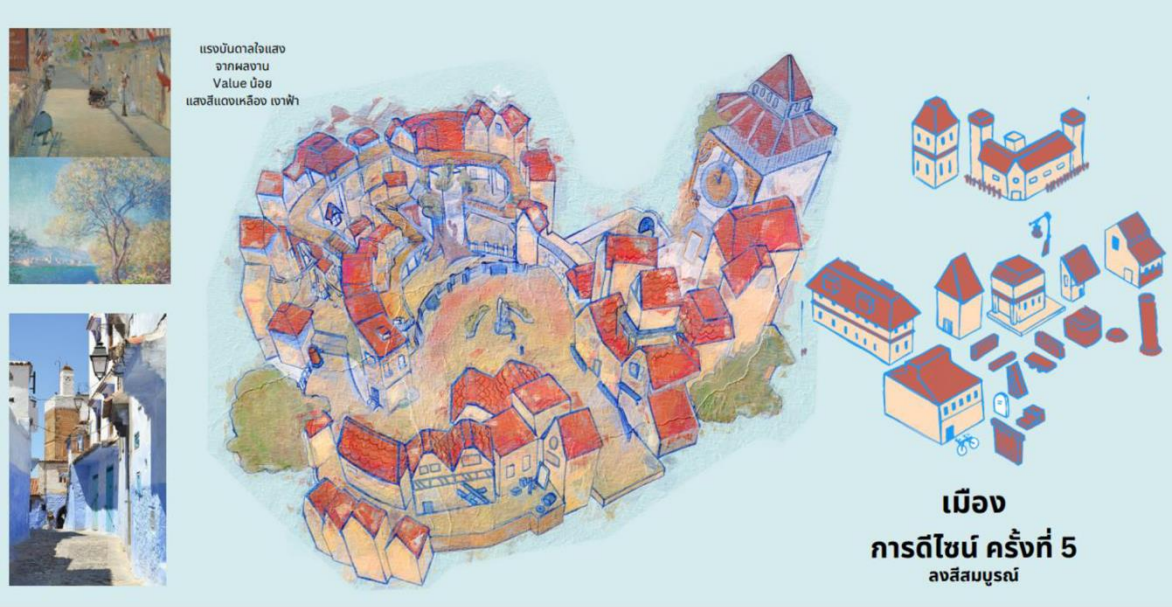


**Figure 5** Environment Game Design

In terms of colour palettes, the design will draw from paintings that closely resemble the desired aesthetic, using similar hues and techniques to create an immersive environment that reflects the vibrancy and luminosity of Impressionist art. The careful selection and application of these colours will enhance the visual authenticity of the game, ensuring that players feel transported to a world reminiscent of the Impressionist movement.

**Phase 3: Development of a Playable 3D Game Environment**

The final phase involves implementing the designed elements within Unreal Engine 5 to create a functional and immersive 3D game environment. This phase is dedicated to achieving playability, ensuring that the game mechanics and visual effects accurately reflect the Impressionist style while providing an engaging player experience. Techniques employed include:

**Figure 6** 3D Player in Game Environment

**Lighting and Rendering:** Advanced lighting and post-processing effects are used to simulate the effects of natural light at various times of day, replicating the shifting colour palettes characteristic of Impressionist works. Real-time rendering capabilities in Unreal Engine allow for nuanced colour gradations and dynamic lighting that enhance the Impressionist aesthetic (as shown in Figure 6).

**Gameplay Mechanics:** Mechanics such as movement, exploration, and combat are designed to enhance the player's interaction with the art-inspired environment. Combat sequences incorporate visual effects that echo the movement and spontaneity of Impressionist brushstrokes, while exploration is encouraged through environmental storytelling, where players uncover narratives embedded within the landscape.

**Atmospheric Elements:** The game's atmosphere is reinforced by environmental sounds, weather changes, and day-night cycles, all contributing to a sensory experience that brings the Impressionist vision to life. This combination of interactive elements and immersive design serves to heighten the player's engagement with the Impressionist-inspired world, encouraging interpretation and emotional connection with the game's visual and thematic components.

## Results

The research project, 3D Game Design Based on Impressionist Art: The Colours of the Knight, has yielded results organized into four main phases, each essential to the development and implementation of the game:

### 1. Results from the Study of Impressionist Art

The study focused on the Impressionist movement, which marked a shift from traditional art with its rapid brushstrokes and avoidance of dark or muddy colours. Impressionist artists preferred working outdoors to capture natural light, resulting in works that depicted everyday life, atmospheric scenes, objects, and beloved individuals with a realism infused with subjective emotion. The study provided insights into how these techniques could be expanded upon within a 3D game world. Inspired by frequently depicted settings in Impressionist art, such as flower gardens, ponds, towns, and fields, the research focused on reimagining these locations to create an immersive, explorable world in the game.

**2. Results of Character, Item, and Environment Design**

Character designs include the player character and three enemy types, alongside items and environments, all modeled in 3D using Blender. These models were textured in Substance Painter to add realistic details that align with the Impressionist aesthetic before being imported into Unreal Engine. The design process was divided into three main components:

*Player Character:* Modelled to reflect elements of the Impressionist era, including costume details inspired by the period's styles.

*Enemies:* Designed to represent threats that could "damage" the game world, similar to how pests, such as insects, mould, and rodents, can damage artwork.

*Environments and Items:* Modelled to match the natural, light-filled outdoor scenes popular in Impressionist art.

**3. Results of Gameplay Design**

The gameplay was structured to reflect the themes and visual qualities of Impressionism. Players interact with the environment and solve puzzles that connect with the artistic concepts of light, movement, and perception, bringing the Impressionist style into the mechanics of exploration and problem-solving.

**4. Results of Cutscene Design**

The cutscenes were carefully crafted to enhance the game's narrative, using cinematic techniques to replicate the feel of Impressionist paintings in motion. These scenes highlight moments of discovery, character interactions, and the player's progression, using colour, light, and texture in ways inspired by classic Impressionist works.

The cutscenes integrate visual themes derived from the Impressionist style, emphasizing realism in daily life and using fast, expressive visuals to capture emotional resonance. These sequences aim to translate the sensory experience of Impressionism into an interactive medium, making the game feel like a world in which players are surrounded by living paintings.

## Discussion

Designing a game often mirrors the journey through a classic RPG dungeon, where each step presents a new layer of complexity and challenge. From confronting towering boss battles to deciphering hidden puzzles, game development requires navigating uncharted territory, sometimes without a clear guide or map. But each of these challenges—no matter how frustrating—becomes an experience point, enhancing our skill set and preparing us to tackle even greater obstacles in the future.

**Foundations in Game Design**

Laying a solid foundation by learning game design fundamentals is critical. Choosing courses that provide structured, easy-to-understand instruction tailored to the type of game we aim to create is especially valuable. Courses covering 3D modeling, animation, game mechanics, and level design in specific engines (like Unreal Engine or Unity) help to streamline the learning process. They allow us to grasp the essential tools and techniques needed to design, prototype, and test ideas efficiently. This foundation minimizes errors, improves workflow, and gives us confidence as we take on more intricate tasks.

**The Value of a Creative Feedback Loop**

Having friends or colleagues who enjoy gaming is another invaluable asset. By exchanging ideas with others who share our passion, we gain fresh perspectives and innovative ideas that we might overlook on our own. Collaborating in this way enriches our vision and helps refine game elements, from level design and gameplay mechanics to visual

aesthetics. Feedback from friends who playtest early versions can highlight aspects like balance, difficulty, and player enjoyment, ensuring the final product is engaging and enjoyable. Moreover, sharing the journey with others provides emotional support, which is crucial for maintaining motivation.

**Embracing the Journey of Growth and Problem-Solving**

Game development is often unpredictable, filled with moments of trial and error, yet this unpredictability is precisely what makes it so rewarding. Each problem encountered teaches us more about our tools, strategies, and even our creative instincts. Setting achievable milestones, learning continuously from both successes and setbacks, and celebrating small victories are essential parts of the process. Documenting our journey can help track progress, highlight growth, and offer valuable insights for future projects.

Ultimately, game design is about both persistence and a passion. While the development path may be full of obstacles and intense problem-solving, it is also a profound learning experience that refines our skills, encourages creative exploration, and fosters resilience. Embracing this journey—enjoying every challenge and growth opportunity it presents—transforms game development from just a goal-oriented task into a deeply fulfilling process that is as enriching as the final game itself.

## Conclusion

**Unreal Engine Game Development Capabilities**

The study of Unreal Engine 5 for game development revealed several critical advantages, particularly in its graphical prowess. This engine leverages high-end lighting and shadow techniques, notably with its “Lumen” global illumination system and “Nanite” virtualized geometry technology, which facilitate realistic light interaction and detailed, high-quality assets without excessive memory usage. These features enable developers to create visually stunning environments that resonate with realism, from intricate character models to vast landscapes.

Another benefit lies in its cross-platform support. Unreal Engine 5 allows seamless adaptation of games across multiple platforms, such as PCs, consoles, and mobile devices, by optimizing performance for each platform individually. This multi-device compatibility enhances the game’s accessibility and reach, opening up potential for a wider audience. Additionally, Unreal Engine's community-driven resources and a vast array of assets in the Unreal Marketplace allow developers to integrate pre-made models, textures, and scripts, accelerating the development process and ensuring consistency in quality.

A key component is its “Blueprint Visual Scripting” system, which offers an intuitive, code-free scripting experience. This system enables developers to design intricate game mechanics and event-driven gameplay without needing extensive programming skills. This functionality is invaluable for novice developers and smaller teams seeking to implement complex game features while conserving resources.

Unreal Engine 5’s licensing model is particularly advantageous for independent developers and small studios, as it allows free access to the engine until the game generates significant revenue. This revenue-sharing model with Epic Games opens up high-caliber development tools to budget-constrained creators, enabling them to produce polished, commercially competitive games.

The Unreal Engine ecosystem, therefore, combines advanced graphics, cross-platform compatibility, robust community support, and cost efficiency, positioning it as a leading option for developers interested in creating visually impactful and commercially viable games for a broad audience.

**Study of Impressionist Art**

The Impressionist period was a transformative time in art, marked by a break from traditional artistic norms and techniques. Emerging in the late 19th century, this movement was shaped by notable social, political, and economic changes. Major historical events, such as the Franco-Prussian War, the fall of the Second Empire, and the establishment of the French Third Republic, influenced the collective mood and societal values, leading artists to explore themes that resonated with these shifts.

Impressionist artists embraced a departure from conventional studio environments, favoring outdoor locations to capture fleeting light, weather, and daily life with a fresh immediacy. They used rapid, expressive brushstrokes and avoided dark hues, especially black, which were commonly associated with earlier art periods. Instead, they opted for lighter, more vibrant palettes, representing life through an impression rather than a precise replication. This approach imbued their works with emotional depth, creating a snapshot of a moment that felt authentic and relatable.

Cultural and philosophical developments also informed the movement. Darwin's theory of evolution and rising existentialist ideas encouraged people to view humanity and nature through new perspectives, challenging traditional interpretations. The urbanization surge during this era provided both inspiration and social critique, as artists depicted industrialized landscapes, cities, and modern individuals within these evolving settings.

The Impressionist movement was shaped profoundly by the socio-political and scientific changes of its time. Artists responded to the upheaval with innovative styles that broke from rigid academic norms, celebrating the transient and the ordinary. Their techniques allowed them to document life in ways that resonated with a rapidly modernizing world, offering viewers a raw glimpse into the social landscapes of their day.

**Three-Dimensional Game Design: "Palettes Knight"**

The concept of "Palettes Knight" integrates elements of Impressionism into its 3D game design, creating an immersive narrative where players engage in a quest to protect and preserve art. Inspired by the brushwork and tonal qualities of Impressionist works, the game’s design presents unique settings—gardens, rivers, towns, and fields—that players explore as they seek out lost or damaged paintings. These settings draw players into a world informed by historical Impressionist pieces, blending artistic exploration with gameplay.

The level design features enemies, like mold and natural decay agents, that threaten the preserved art, adding depth to the game's combat and narrative. These "enemies" not only serve as antagonistic elements in the gameplay but also symbolize the real-world challenges in art conservation. By combating these forces, players indirectly learn the value of preservation and the delicate nature of artworks. Each level thus reinforces the game's underlying themes of appreciation and protection of cultural heritage, giving players a dual experience of learning and engaging action.

The colour palette is essential in mirroring the light, vibrant tones typical of the movement. Shades inspired by Monet's landscapes and Renoir’s cityscapes are applied to environments and characters alike, creating an immersive visual style that reflects the warmth and vitality of Impressionism. In addition, each area in the game employs a unique visual atmosphere, depending on time of day and weather, which recalls the techniques used by Impressionists to depict light.

The design of characters, enemies, and levels in "Palettes Knight" not only provides players with a visual and narrative journey but also presents an educational opportunity, connecting them to Impressionism in an accessible, interactive way. By exploring these thoughtfully crafted environments, players gain a richer understanding of the artistic style, its techniques, and the historical context that shaped it.

In conclusion, "Palettes Knight" achieves a balanced blend of art and entertainment, making it an innovative approach to both gaming and art appreciation. It presents Impressionist art as more than an aesthetic, inviting players to experience it as a world that is visually captivating and rich in historical and cultural resonance.

## References


Alexis Clark, Frances Fowle. (2020). *Globalizing Impressionism: Reception, Translation, and Transnationalism.*

Anthea Callen. (2000). *The Art of Impressionism: Painting Technique and the Making of Modernity.*

Bourgonjon, J., De Grove, F., De Smet, C., Van Looy, J., Soetaert, R., & Valcke, M. (2013). Acceptance of game-based learning by secondary school teachers. *Computers & Education,* 67, 21-35.

Emma Grahn. (2013). *Modern Pixel art Games BA*, Blekinge Institute of Technology, Sweden.

Game Design with Michael. (2018). *What are loops in game design?* – Loops – game design theory [Video]. YouTube. https://www.youtube.com/watch?v=PMj8Q4ViKzs

Gamify. (2020). *How to make a video game on Wix in 5mins* [Video]. YouTube. https://www.youtube.com/watch?v=7xCsrI1V8R0

Juegoadmin. (2021). *Game Development Models*, The Secret Behind the Successful Development of Popular Games. https://www.juegostudio.com/blog/game-development-models-the-secret-behind-the-successful-development-of-popular-games.

Kafai, Y. B. (2006). Playing and making games for learning: Instructionist and constructionist perspectives for game studios. *Games and Culture,* 1(1), 36-40.

Mary Keo. (2017). *Graphical Style in Video Games*, BA, HAMK Häme University of Applied Sciences, Finland.

Ortigara J, Yuan D, Loso H, Potter A, Garavan HP Chaarani B. (2022). Association of Video *Gaming with Cognitive Performance Among Children*. JAMA Netw Open.

Steven L. Kent. (2010). *The Ultimate History of Video Games:* From Pong to Pokemon--The Story Behind the Craze That Touched Our Lives and Changed the World New York. Three River Press.