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Shaif Hemraj

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Article abstract

In the increasingly competitive landscape of the games industry, working efficiently is essential for ensuring products meet audience expectations and work as intended. Various elements can play a key role when attempting to develop games smoothly and successfully, as time, money and technical capabilities can be very limiting factors that can require careful consideration. For this research, this paper will explore three key examples of such elements, which are art styles, AI tools, and the role of creative expression during the development process. Each of these examples can be notable factors towards streamlining production tasks and accelerating development, which can be especially important in the fast and competitive games industry. The choice of an art style, for instance, can save time, effort and costs while also being more optimal for performance and for supporting a chosen theme. The role of creative expression is also something that should not be understated, as it can be vital for finding solutions to problems, as well as preventing other potential issues. Finally, AI tools have demonstrated significant potential and numerous possibilities to help streamline various tasks related to the games industry, such as programming, artistic production and organizing data. By analyzing these three elements—art styles, AI tools, and creative expression— this paper will aim to provide a stronger understanding of how they can contribute to ensuring a more efficient game development process.

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Maximizing Efficiency in Game Development Through Art Styles, AI Integration, and Creative Expression

Shaif Hemraj
University of Westminster
S.Hemraj@westminster.ac.uk

Abstract

In the increasingly competitive landscape of the games industry, working efficiently is essential for ensuring products meet audience expectations and work as intended. Various elements can play a key role when attempting to develop games smoothly and successfully, as time, money and technical capabilities can be very limiting factors that can require careful consideration. For this research, this paper will explore three key examples of such elements, which are art styles, AI tools, and the role of creative expression during the development process. Each of these examples can be notable factors towards streamlining production tasks and accelerating development, which can be especially important in the fast and competitive games industry. The choice of an art style, for instance, can save time, effort and costs while also being more optimal for performance and for supporting a chosen theme. The role of creative expression is also something that should not be understated, as it can be vital for finding solutions to problems, as well as preventing other potential issues. Finally, AI tools have demonstrated significant potential and numerous possibilities to help streamline various tasks related to the games industry, such as programming, artistic production and organizing data. By analyzing these three elements—art styles, AI tools, and creative expression— this paper will aim to provide a stronger understanding of how they can contribute to ensuring a more efficient game development process.

Keywords

Game Development, AI Integration, Creative Expression, Efficiency, Generative Art, Game Art Production, AI Tools

Introduction

The games development industry has experienced a notable rise in growth and transformation over the past few decades, to the extent where it is often seen by many to be the most dynamic and competitive sector in entertainment (Rykała, 2020). However, it is no secret that the games industry also comes with its fair share of challenges, such as rising development

costs, increased audience standards and the added pressure to maintain relevance amongst competitors, that has encouraged companies to rush products, overwork developers and even compromise creative integrity to maintain a profit (Larsson, 2018). Both indie and major developers have had to adapt in various ways to increase their odds of success, to the extent where some methods can be observed as noticeable patterns for valid and safe strategies. The need to balance creativity and efficiency with constraints such as time, money and technological resources is critical to deliver innovative products that meet audience standards (Banks, & Keogh, 2021). However, it is worth noting that an over emphasis on efficiency through AI automation, design templates and following pre-existing conventions may potentially homogenize gameplay and stifle innovation in the industry. This raises the important question: can game studios optimize efficiency without compromising artistic and creative integrity in the development process?

This research aims to highlight three key factors that can prove beneficial for efficient games development, which are art styles, AI tools, and creative expression. By examining these elements in the context of successful game development, this paper will demonstrate how making strategic art style decisions can optimize resources and enhance thematic consistency, how AI tools can streamline workflows and reduce the burden of repetitive tasks, and how fostering creative expression can support innovative solutions and a more cohesive development process. Not only do these examples represent effective strategies for game developers but they can also serve as valuable lessons applicable across various projects in the games industry. To guarantee the accuracy of the research findings, data collected from articles, interviews, books, and papers will be presented to support this paper's claims. Following this, a comparative analysis and existing case studies from the games industry will be looked at to further demonstrate how art styles, AI tools and creative expression can make a notable contribution towards maximizing efficiency in the games development process. By understanding and applying these principles, studios of all sizes may be able to better navigate the complexities in the games industry and increase their chances of delivering successful, well-received products.

Literature Review

The Impact of Art Styles in Games Development

The choice of an art style when developing a game can play a major role towards shaping the overall player experience, marketability and other critical elements such as game mechanics and narrative delivery (Sarver, 2021). An often-understated benefit that art styles can have in games, however, is their ability to potentially streamline certain aspects of development due to how some art styles can be significantly easier to produce assets for than others (Juul, 2019). As a result, the choice of art style can potentially save developers time, money and effort, which can be particularly advantageous for smaller development teams or indie studios with limited resources. On top of this, art styles that tend to follow a simple visual aesthetic can also be less technically demanding in terms of hardware, which can be very useful when trying to produce games that can be played on a wide variety of devices with differing specifications (Keo, 2017). It is for this reason that many of the top-grossing mobile games tend to avoid pushing the limits

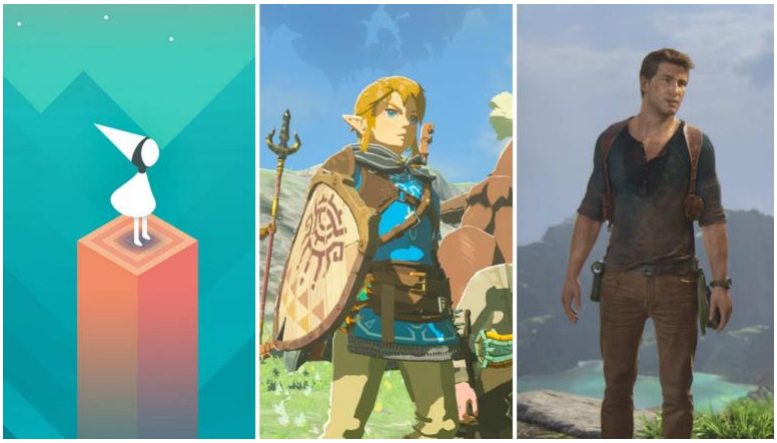
of what is possible with graphics and instead opt for visual aesthetics that are guaranteed to run smoothly on a wider range of mobile devices. In terms of classifying art styles, it is worth noting that they can generally be grouped into various broad categories with distinct characteristics. In this article, I will discuss three notable examples of existing art styles in games that tend to remain consistent throughout modelled frameworks, with reference to those proposed by Cho et al. (2018) and Wattanasoontorn et al. (2019). Both frameworks tend to define these art styles on different levels of abstraction, but the consensus between them is that these styles have notable characteristics that set them apart. These three chosen art styles are (photo)realistic, stylized (caricature), and simplified (minimalism).

As suggested by its name, games that follow the approach of photorealism tend to mimic the real world as closely as possible, which can require developers to place a strong focus on detailed textures, accurate lighting and lifelike physics (Dinur, 2021, p. 1). This approach, however, can come with high production costs, long development times and the need for powerful hardware to ensure that the visual experience can be balanced with smooth performance (Lima, 2022). Games that utilize a stylized visual aesthetic are notably different, in that they instead use artistic exaggeration, vibrant colors, and creative design choices to convey a unique aesthetic without needing to replicate real-world elements as accurately (Norvasto, 2018). In essence, games produced with this art style can benefit from amplified characteristics through simplification, as specific details can be emphasized to communicate concepts and ideas, allowing for more expressive elements (Manning & McCloud, 1998). This can also allow for timeless appeal and additional flexibility while requiring less effort and attention to detail from developers.

Similarly, games that follow a simplified or minimalist visual style can also save developers time, money and effort while maintaining an elegance that can still look visually appealing (Nguyen, 2021). This approach can require significantly less effort from artists, allowing for a stronger emphasis on other areas, such as storytelling and level design. It is for this reason that indie developers often opt for a visual aesthetic that falls under the classification of a simplified art style, utilizing methods such as low-poly or pixel art. Like games with stylized visuals, the simplified aesthetic can also be beneficial because of its ability to strip away unnecessary details so that core elements of gameplay and narrative can be focused on, making it easier to emphasize key areas (Hölttä, 2018). The artistic choice of a low-poly aesthetic in games such as Journey or Firewatch are notable examples of how a visual style can help optimize resources while also contributing to forming an artistic identity. Not only does the choice of abiding by a theme of simplified geometric shapes and minimalist designs help reduce the strain on hardware and minimize production time, but it can also work as a distinctive visual style that helps convey emotional topics in ways that detailed, photorealistic visuals might not.

Figure 1

A Comparison Between Games with Different Art Styles. From Left to Right – Monument Valley (Simplified) (Ustwo, 2014), The Legend of Zelda: Tears of the Kingdom (Stylized) (Nintendo, 2023) and Uncharted 4 (Photorealistic) (Naughtydog, 2016)

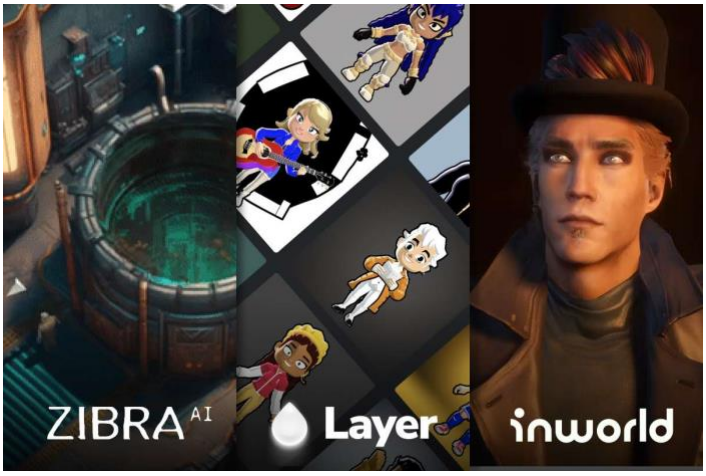


AI Tools and Their Influence on Project Efficiency

Artificial Intelligence (AI) tools have increasingly become integral to the game development process, as their usage can help studios by enhancing their potential for efficiency, as well as reduce production costs and required effort (Filipović, 2023). This is a sentiment echoed by experienced industry veterans, such as Promethean AI CEO Andrew Maximov, who argues that the integration of artificial intelligence tools in the industry may be vital for keeping the soaring costs of developing games down, while also saving time by automating repetitive tasks (BBC, 2023). As a result of these benefits, the use of AI tools in the games industry can save time, essentially allowing for more emphasis on creative possibilities when the repetitive tasks are efficiently automated. There are a wide variety of areas in games development in which the use of artificial tools can ease and speed up the process, such as asset creation, programming and even level design (Chia, 2022). For instance, tools such as Promethean AI can assist in generating and organizing 3D environments, and others such as Artbreeder can aid in AI-assisted character concept art (Vetoshkin & Rozhnov, 2024). NVIDIA DLSS is also a notable example, as it can enhance rendering efficiency by using deep learning for image upscaling (Mengistu, 2023). This can be very beneficial for games that require extensive manual labor throughout their development, such as open-world games where the placement of foliage, rocks, and other environmental details can take up a notable amount of development time. Sometimes, however, this may introduce additional manual labor for artists and developers, as many AI-generated assets require extensive cleanup and refinement to remove artifacts, inconsistencies, or unintended distortions. This issue, sometimes referred to as AI "hallucination," can lead to unreliable outputs that require human modifications to ensure quality and consistency (Zhang, Xu, & Pan, 2025).

Figure 2

AI tools can streamline production, such as Zibra.ai for enhanced visual effects on low-end devices, Layer AI for faster asset creation, and Inworld AI for intelligent NPCs



Moreover, AI tools can also be very beneficial for playtesting and quality assurance, as they can process large amounts of data through studying player analytics to provide insights into player behavior, allowing developers make more informed decisions about game design and balance (Roohi, 2022). As traditional methods may rely on predefined models and human input, this can make them less capable than AI tools for adaptation and refining based on new, dynamic information. On top of this, AI integration for this process can also surpass traditional data analytics through its ability to process vast amounts of information at a far faster rate, as well as identify patterns that could easily be missed by human analysts (Pfau et al., 2020). This can ensure that the most ideal adjustments are made to difficulty levels, in-game economies, or narrative pacing so that the overall player experience can be more enjoyable. By using AI to collect and analyze data, not only can time be saved, but the general quality and reliability of games can be improved due to AI's ability to streamline the process of obtaining key information that can then be turned into constructive feedback (Pfau et al., 2020). This can also be very useful for streamlining tasks and organizing information involved in other areas in the game industry, such as marketing and customer support. Essentially, the integration of AI tools can help improve the quality of games through various means, with notable examples including better analytics, streamlined feedback collection, time savings, and major cost reductions. It is crucial to consider the risks that can come with this, such as ethical concerns around AI's role in influencing player decisions, particularly when monetization is involved.

It is important to note that the strengths of artificial intelligence usage in games development need to be balanced with its weaknesses, as creativity is inherently human, driven

by personal experiences, emotions, and cultural contexts (Kaufman et al., 2010). On the other hand, AI-generated content lacks such qualities and purely operates on pre-existing data in the form of logic and algorithms (Aldoseri et al., 2023). AI usage can eliminate many repetitive background tasks that are perfect for automation, such as image upscaling, texture mapping, and even background dialogue for non-playable characters (Hu et al., 2023). Additionally, AI usage may be incredibly effective for tasks that rely more on volume, such as automatic placement of environmental elements like foliage and rocks, a task that some may argue is somewhat tedious but necessary. It is for this reason that an overreliance on AI tools may potentially homogenize games and limit their creative potential, which is why using it for specific tasks that do not require creative thinking is more ideal for developers who want their products to stand out. For instance, a human would have a much better chance of successfully imbuing characters, storytelling, and worldbuilding with depth, a task that AI tools may struggle with due to their reliance on preexisting data. Additionally, having a human become involved in this area could also prevent the reinforcement of outdated tropes, representation biases and generally the making of games feel formulaic as opposed to innovative. Taking creative ideas made by humans and having artificial intelligence tools convert them into concept art is also a valid example of AI helping rather than harming, as doing so can ease the process of both character and environment design, simply because it instead involves providing a machine with instructions (Werning, 2024). Having human involvement continue to play a key role in the process is crucial if originality, cultural sensitivity and meaningful worldbuilding is to be ensured.

Investing in AI usage in the games industry will also require developers to consider the many concerns that can come with its usage, such as the energy impact. While this issue will likely be mitigated as AI technology becomes more optimized over time (as evidenced by China's Deepseek software which uses far less memory than its rivals), other concerns remain. For instance, an overreliance on AI may reduce opportunities for aspiring developers to gain new experience in foundational skills such as entry-level programming and texture mapping, as automation may limit such opportunities. Relying too much on AI assistance may cause some to become overdependent, leading to a lack of problem-solving skills such as debugging and asset optimization that can come from learning first-hand. Using AI for more technical and repetitive tasks can save developers time, money and effort—essentially pushing the limitations of what can be achieved within a strict deadline. However, a proper balance must be considered, in which automation is approached with care to avoid limiting the development of essential skills in the industry. For instance, its usage could be treated more as a tool rather than a full replacement in training programs. This way, AI can complement and enhance creativity, rather than replace it.

There will always be value to human creativity, emotional intelligence, and the complex decision-making abilities that AI cannot replicate, which is why automating tasks such as writing, asset creation, and programming could do more harm than good. Automation in writing and design, for instance, can potentially lead to bias, which can come in many forms. A notable example of this comes from *The Sims 4* (2014) which contained a character creation tool with a tendency to avoid generating diverse characters and instead often stuck with specific races, body types and hair styles (Tocci & Dillahunt, 2020). This issue stemmed from a lack of representation in the game's pre-made characters, highlighting how relying on specific data can cause AI to unintentionally have a preference and filter out other options. This is a notable example of homogenization at play as well, as too much AI integration in the wrong areas can

unfortunately lead to a lack of diversity and novel concepts, making games feel generic and formulaic.

The Impact and Benefits of Creative Expression

Creative expression, broadly defined, is essentially the ability to generate interesting new ideas, concepts, or artistic visions that can help shape a project's direction and execution, which can be particularly necessary for games development. This can relate to mechanics, storytelling, worldbuilding and design choices that have a major impact on the entire experience. Not only is creative expression essential to support innovation and player engagement, but its influence plays a crucial role in finding efficient problem-solving techniques throughout various stages of production when developing games (Hall et al., 2020). By integrating creative expressions strategically, developers can come up with innovative solutions to solve challenging problems, as well as save time, reduce costs and optimize resources. It is important to note that throughout the history of the games industry, creative solutions have played a vital role towards ensuring that concepts and ideas are feasible (Tap, Zin, & Sarim, 2019). This is in part due to the restraints and limitations that games can have in terms of hardware limitations, as rendering capabilities and storage capacities have imposed notable limitations since the inception of interactive software (Dalmau, 2004).

To overcome these obstacles, many developers have often had to employ creative ideas for optimization purposes to prevent long loading times or software crashes. This is where the role of creative expression can come in, as some solutions can do more than solve problems when utilized correctly. In fact, there are notable cases in which optimization solutions have also played an integral role towards generally improving the overall player experience as well, as they can take the form of ideas that can potentially influence a games atmosphere and even narrative. For instance, creative expression can be used to integrate loading processes into a game's narrative or even theme, turning a technical necessity into an element that can even go as far as to enrich and improve the player's experience. This can come in the form of illusions known as transparent loading techniques, such as using narrow paths or scripted scenes such as travelling in elevators to cleverly hide the process of loading game assets, which can help contribute to a theme and even be useful for delivering key storytelling components (Antognoli & Fisher, 2023). Essentially, the use of creative expression in this context not only improves game functionality but can contribute to other areas, taking something that could initially be seen as boring and fixing it so that it solves this issue as well as others.

By employing such creative strategies, developers can save time, money and effort, which is necessary for optimizing efficiency in games development, as for any other development. By streamlining the production process through creative methods, it can free up more time to focus efforts on enhancing other areas involved throughout development, such as core gameplay elements and visual quality. This way, the use of beneficial, problem-solving approaches that are often conceived through creative expression essentially serve as a win-win solution that can benefit everyone. By using creative ideas, constraints in games development can be turned into opportunities (Kultima, Alha, & Nummenmaa, 2016), even to the extent

where the use of strategies can become a core staple of a franchise, regardless of whether it is even needed. This is actually often the case for games that embrace the use of low-poly models for player skins, as their integration can appeal to players' nostalgia and work as a beloved aesthetic choice despite their initial appearance only emerging as a result of technical limitations.

Figure 3

In Super Mario Odyssey *(Nintendo, 2017), players can wear a low-poly skin for Mario. Although this is entirely optional, it can add a nostalgic touch because of echoing early 3D graphics*

Case Studies

Embracing Visual Simplicity in Thomas Was Alone

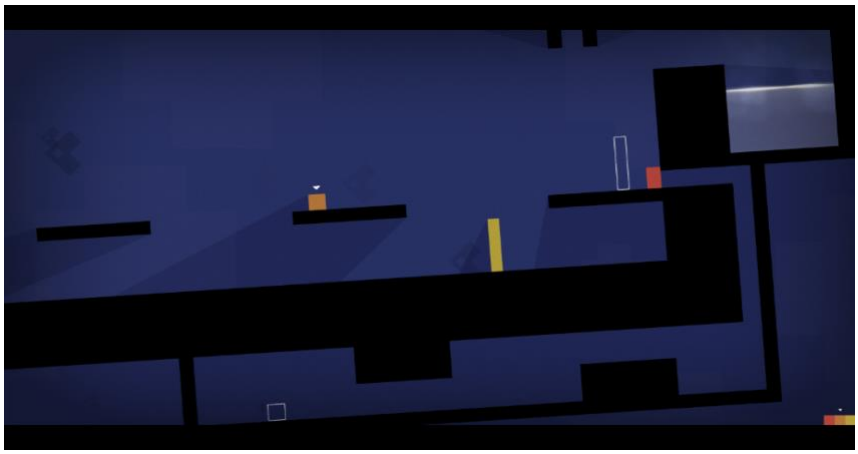
Thomas Was Alone (Bossa Studios, 2012) is an excellent example of how applying a visual aesthetic that follows a simplified art style can be a powerful strategy, as not only can it be more efficient in terms of saving time, but also for accomplishing a lot with limited resources. Developed by Mike Bithell and released in 2012, Thomas Was Alone is a notable example as to how indie games with a low budget can still succeed through sheer creativity, as well as produce a meaningful and impactful gaming experience. The game notably featured a unified minimalist aesthetic consisting of simple geometric shapes that were each characterized with different colors and sizes to separate their appearance between characters, environments and objects. It placed a strong emphasis on telling an engaging story involving companionship and working together to reach new places, managing to do so through a combination of excellent writing and voice acting despite the characters being simple shapes.

Not only was the decision to work with a minimalist art style a bold, creative choice, but it also worked in a practical sense. This is because choosing a simplistic art style can be helpful for saving a significant amount of time, money and effort during development, allowing games to be more accessible for low-range hardware due to its general lack of graphically demanding visuals (Grabarczyk, 2016). By doing so, Bithell could focus more on the storytelling and

gameplay mechanics, rather than allocating a significant amount of time to other areas, such as animation and character design. In essence, the choice to go with this style not only streamlined the entire development process and made it more efficient but it also worked in a way to highlight the game's core strengths, allowing it to succeed and stand out. The game stands as a strong example of how a well-executed minimalist approach can lead to a product that is just as compelling as one with highly detailed visuals, proving that games can succeed without requiring an extensive and costly development process.

Figure 4

Thomas Was Alone (Bossa Studios, 2012) uses a minimalist aesthetic with simple, colorful geometric shapes to emphasize storytelling through its environments



Placing an emphasis on creative expression and a powerful narrative while wisely working with an efficient, yet suitable visual style are likely powerful factors towards its success, as its worth noting that the game achieved over 1 million downloads in terms of sales (Forbes, 2014). However, it is also worth noting that if the game had been developed after the release of modern AI tools, it is likely that various aspects of the development process could have been further streamlined. For instance, there are many AI tools and programs such as ChatGPT that can automate and optimize specific tasks in Games Development, such as creating advanced programming scripts in the Unity engine for jumping and smooth camera movement. In addition, certain repetitive tasks often involved in games development can now require less effort due to the overall potential of automation, such as efficient data management and AI-driven playtesting. It is for these reasons that AI technology can benefit both indie and major game studios, as they offer the potential to reduce what can be needed for key roles throughout all stages of production. From an indie developer's perspective, the choice to combine simplistic visuals, creative expression and artificial intelligence tools can make for a powerful recipe for producing high-quality games even with a low budget and lack of resources.

Utilizing Generative AI in Microsoft Flight Simulator

Microsoft Flight Simulator (Asobo Studio, 2020) is a notable example of how the integration of AI tools in games development can make seemingly impossible tasks that would take decades to complete achievable within short, manageable timeframes. For context, this game famously contained a 3D render of the entire planet earth within the game itself, meaning that players could simulate flying around the earth accurately (Vlačić et al., 2022). According to Microsoft, this was possible by using Azure AI where petabytes worth of Bing Maps satellite photo data was utilized through machine learning to effectively recreate the world (2021). This meant reconstructing over a billion lifelike buildings, as well as authentic monuments and landscapes. On top of this, AI-driven procedural generation was also needed to automatically create buildings, forests, and other natural features in less-documented regions of the world, so that a lifelike appearance could be maintained (Blackshark.ai, 2024).

According to Blackshark.ai, the use of their AI tools played a significant role in making the development of this game a feasible and manageable task, as not only did the games visuals rely on the use of artificial intelligence, but also many of its key features, such as real-time accurate weather simulations, traffic systems and the game's autopilot (2024). It is evident that without the use of Artificial Intelligence, it would be extremely challenging, if not impossible, to produce a game like this where players can travel the entire world with such a level of detail, realism, and scale. *Microsoft Flight Simulator* (2020) stands as a shining example as to why the integration of AI tools in software and games development can not only significantly improve efficiency but also make seemingly impossible tasks achievable. This, in turn, can enhance the gameplay experience, such as how *Microsoft Flight Simulator* (2020) also simulates complex interactions like weather systems, natural disasters, or evolving ecosystems to make the game more fun and engaging as well as impressive. A balance between efficiency and avoiding repetitive elements will still need to be made, however, as relying too heavily on procedural generation can lead to environments feeling repetitive, lacking distinctiveness, and even containing unrealistic or awkwardly generated features. This is notably what *No Man's Sky* (2016) was heavily criticized for, as reviewers argued that its over-emphasis on procedural generation made the game feel empty and formulaic. Thankfully, the developers of that game learned from feedback, and refined and expanded areas through a more balanced approach that incorporates more human input (Cardona-Rivera et al., 2017). This included carefully crafted narrative elements and handcrafted structures to guide and shape the experience.

It stands to reason that these tools may also allow smaller development teams to achieve incredible goals in short timeframes, as they offer the potential to expediate many challenging and difficult tasks that can often come with games development. This can also be applicable for large development teams that produce game series that involve real-life locations, such as *Assassins Creed* or *Watchdogs*, where the use of such AI tools can be very promising for saving time. Moreover, the use of AI-driven procedural generation and data processing can also be useful for games that can be continuously updated and improved post-launch, such as *Microsoft Flight Simulator* (2020). In the case of this game, new satellite data can be analyzed through AI as soon as it becomes available, making it so that the game world can be updated to remain as

accurate and current as possible. This is a notable example as to how AI integration can extend a game's lifespan and reduce the need for costly and time-intensive manual updates. The use of AI in *Microsoft Flight Simulator* also presented challenges, as automation must be balanced with manual refinement to avoid AI hallucination issues such as unnatural terrain formations or incorrect building models. In many cases, AI content can also lack the creative touch and nuanced details that human designers might bring to the table (Burlacu, 2023), which is why oversight can be very necessary to modify AI-generated assets to ensure that they meet artistic and functional standards. Without human oversight, AI tools can cause mistakes, such as misinterpreting satellite data by placing objects or geographical features incorrectly.

Figure 5

Comparison between visuals during the approach to Madrid Barajas Airport. Real Life and Microsoft Flight Simulator *(2020). Uploaded by Sim vs Real on YouTube*

How Fog in Silent Hill Fixes Issues and Enriches the Theme

Silent Hill (1999) is a notable example of how hardware limitations in games can inspire ideas that can then go on to become staple components in games series. To provide necessary context, it is worth noting that fog was a common solution to hide rendering issues in the earlier days of gaming where hardware limitations made it so that only a set amount of assets could be shown on a screen at a time (Wills, 2019). In some cases, the use of fog can be received negatively by critics due to how it can impact on the overall experience, with Superman 64 being a very notable example due to its excessive usage (Piatti-Farnell, 2021). *Silent Hill*, however, is notable for using fog as more than just a technical workaround for hardware limitations, by heavily integrating it throughout the experience as a key atmospheric and narrative element, essentially elevating its horror genre status (Perron, 2012).

Figure 6

In Silent Hill *(1999), fog is effectively used as an atmospheric tool that not only enhances the environment to suit the horror theme but also reduces rendering requirements*

Essentially, fog's use for this purpose was praised since it was an embraced component instead of an unfortunate necessity, due to how it also enhanced the overall horror experience by making the game environment more eerie and dread-inducing (Kirkland, 2010). It's worth noting that the fog had a symbolic purpose as well, as the town in the game itself was supposed to work as a manifestation of the protagonist's fears and turmoil, which allowed the fog to support this by working as a metaphor for the protagonist's clouded and uncertain thoughts (Steinmetz, 2017). It is for this reason that the fog is still a core component in the more recent games in the series, even though they natively run on more powerful hardware that has significantly fewer limitations in terms of what it can render on a screen. In the broader context of the games industry, *Silent Hill* works as a shining example of how constraints can sometimes encourage developers to come up with creative ideas and solutions that they can then express through game-enhancing features. The game also demonstrates how in some cases technical limitations are not always obstacles to overcome and can instead be seen as opportunities to potentially enhance the overall gaming experience. In general, the use of illusions and creative strategies to make gaming environments appear more detailed than they really are is often a necessary strategy to push what games can be capable of despite the technological limitations of their intended hardware platform/s. In the context of *Silent Hill*, not only did the deployment of fog reduce hardware requirements, it also simplified the production process in some ways, as its usage also meant that the town could look more massive in scope without the need to produce more detailed buildings and areas. In essence, creative solutions can not only be useful for overcoming limitations, but they can also serve as methods to save development time and enhance the gameplay experience as well if done correctly. For instance, not only was fog in *Silent Hill* used to reduce the viewing

distance, but the game also frequently featured roadblocks and other obstacles to imply the existence of more areas that simply could not be explored by the player (Kirkland, 2009).

Comparative Analysis

How Art Styles and Creative Expression can Influence Industry Trends

Art styles in games can serve a variety of purposes that can not only affect a game's identity and how it looks, but also how it is developed, the overall market reception and even its technological requirements. There are notable trade-offs studios need to consider when choosing an art style, as the ability to stand out in a crowded market can play a key role in influencing a product's success. Audiences are more than willing to turn down a potential game if they feel that it looks generic and lacks a key selling point, as success in the games industry can heavily rely on garnering positive attention and appealing consumer preferences. A notable example of a game that succeeded expectations due to its emphasis on brand identity and uniqueness was *Cuphead* (2017), as it famously featured a beautiful hand-drawn aesthetic that allowed it to stand out visually from other games, playing a key role towards its popularity. The game managed to renew interest in hand-drawn and 2D animation within the industry by showing it was still a valid choice for developers, even though 3D games tend to be more common and popular. The use of a hand-drawn aesthetic in *Cuphead* also went on to inspire other developers into making their own games with a similar art style. *Enchanted Portals* (2023) is probably the most notorious example of this, as the game notably faced scrutiny because of its overt similarities to *Cuphead* (Polygon, 2019).

There are other notable instances in which an art style of a game has encouraged a trend amongst other developers, resulting from a variety of reasons. Games that contain minimalist or stylized visuals can inspire indie developers to adopt that approach for their own games, as doing so allows them to still create compelling experiences without the massive resources most often required for photorealistic visuals. A notable example of this is pixel art, which can be nostalgic as well as practical due to its low resource requirements and relatively straightforward production process (Zufri & Ardani, 2023). This visual approach has been utilized in a wide variety of popular indie games such as *Undertale* (2015) and *Shovel Knight* (2014), despite pixel art's association with classic releases from the 8-bit and 16-bit eras. Another popular choice is known as flat design, which applies to a minimalist approach that can lack detailed texturing and lighting to emphasize bright, contrasting colors for an appealing look that can also be optimal for performance (Fenech, 2024).

Culture can also play a role in art styles, as companies from different countries such as Japan and America may adopt a visual aesthetic that reflects their respective cultural backgrounds (Sainio, 2022). For instance, Japanese game developers often draw from their history of manga and anime to produce games characterized by the styles associated with them, which include exaggerated expressions and vibrant colors (Norris, 2009). In contrast, some American developers have leaned towards a different set of influences, such as from western animation or comic books to shape the visual identity of their games, with Telltale Games being a notable example (Ecenbarger, 2016). In some cases, there can be instances of overlaps across

cultures, where visual styles from one country may inspire games from other countries to replicate their art style. Some notable examples of this are *Chained Echoes* (2022) and *Doki Doki Literature Club!* (2017). Photorealistic games can often look similar regardless of the country they are developed in, as the approach involved for making games with that art style is to mirror real-world visuals as closely as possible. As this process can involve producing high-resolution textures, complex lighting systems, and realistic physics simulations, the approach to games development when this art style is chosen showcases how the pursuit of realism in game design can often lead to common ground regardless of their developers' cultural differences (Suomela, 2018).

Beneficial AI Tools and Strategies in the Games Industry

It is no secret that AI tools in the games industry have offered the potential to revolutionize many aspects of the development process, such as playtesting, asset creation and quality assurance. This has come at a time where the industry itself has been facing issues with rising production costs, overworking and a general difficulty to meet consumer expectations (Bulut, 2020). By offering the ability to streamline certain tasks and completely automate others, the use of AI in the development process can not only save time, but also money and resources. AI tools still have flaws, which is why human oversight is especially important to help reap AI's benefits while avoiding the potential additional issues that can be caused by machine algorithms overlooking context sensitive situations. There are various instances where this has been the case, such as the *Grand Theft Auto Trilogy: Definitive Edition* (Rockstar, 2021) where AI-driven image upscaling tools were used to remaster assets, but caused misspelled text on the new textures, causing audiences to ridicule Rockstar on social media (EuroGamer, 2022).

There are a wide variety of AI tools and software now being used frequently in the games industry to automate tasks and speed up the overall production process required for games development. For instance, Promethean AI (according to their website) is a very powerful tool for producing game environments at a faster pace, allowing users to use prompts to describe the types of environments they wish to create so that the generation of appropriate assets can be produced automatically, even taking asset/object placements into account (2024). This can be especially helpful in large-open world games, as the process of creating detailed objects and environments for these generally larger game worlds can be extremely time-consuming (Tan, 2024). By using Promethean AI, artists can be assisted by having AI produce initial elements to work with, that can then be refined by the artists over time. Another very popular tool that is now very commonly used amongst developers is NVIDIA DLSS (Deep Learning Super Sampling). This technology uses AI to improve game performance by using deep learning to upscale lower-resolution images to a higher resolution, allowing for a dramatic increase in framerates by reducing the overall computational load that comes with rendering high quality visuals (Watson, 2020). Thanks to DLSS, users can play more demanding higher resolution games at stable framerates even with weaker hardware, allowing developers to push performance for games that are even released on less powerful devices.

The integration of AI tools can be especially useful for the more repetitive or background elements involved in games development, such as producing optional dialogue and voice lines for NPCs to make an in-game world feel more authentic (Kostilainen, 2024). Crowd chatter and voice lines in the form of background exchanges can often play a crucial part in making a world feel more realistic and immersive, but their inclusion can come at the expense of time and creative effort from writers and audio experts. Thanks to AI tools such as machine learning models used in Ghostwriter, these tasks can free up time for those who can better utilize their skills for more critical elements of games, such as during core plot points (Hu et al., 2024). This is a development strategy being used by major game studio, Ubisoft, which is known for producing popular open-world games. According to Ubisoft research scientist Ben Swanson, scripts for such games can stretch to 100,000 lines of dialogue, which is where the use of AI tools such as Ghostwriter can prove extremely beneficial, providing human oversight is still a factor (Axios, 2023).

How Creative Strategies Inspire Solutions in Development

The games industry is heavily driven by creativity, in that the ability to utilize creative thinking and strategies throughout the development process is often a key element towards ensuring products can work as intended, despite the constraints of a completion date, planned scope and a budget for the cost of necessary resources (Zackariasson, Walfisz, & Wilson, 2006). By doing so, developers can efficiently develop an experience that can address player needs while keeping them entertained. This is also where the industry of games can differ from television and film, by being interactive, meaning that developers must consider player perspectives and how they may react to specific situations (Desurvire, Caplan, & Toth, 2004). For instance, developers may choose to complete set tasks in a game in very specific ways, but players may opt for unconventional approaches, requiring planning for the unpredictability of player behavior. This is where the importance of creative strategies to ensure an experience that everyone can enjoy is so essential, as failing to do so can make a game generally feel more restrictive, and less functional and engaging.

Like the previously mentioned *Silent Hill* and its use of fog to make areas look bigger than they are, developers can use a variety of creative strategies to ease the development process, saving time, money and effort. For instance, they can achieve realistic graphics through illusionary strategies to make environments seem more detailed than they really were, such as fake trees and invisible walls/natural boundaries, so that only detailed areas where players are likely to spend the most time needed to be focused on. This is also a strategy used in games when showing environments at a distance, such as *Super Smash Brothers* for Wii U (Nintendo, 2014) where background elements such as distant buildings can be curved low-resolution 2D sprites instead of 3D models. By doing this, developers can take advantage of the fact that these details may be too far away for players to notice, allowing for time and effort to be saved while also improving the visual quality of the main elements.

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Figure 7

In Super Smash Bros *for Wii U (Nintendo, 2014), stages are presented with fixed camera angles, so developers can save time faking detail in background elements. Images Taken from YouTube Video - Off Camera Secrets |* Super Smash Bros*. for Wii U - Boundary Break*

There are also various examples of how developers have used creative strategies to solve potential problems so that players with different skillsets or preferences can have an enjoyable experience. For instance, there are games out there that use open-world design to encourage exploration and experimentation, essentially making it so that players can explore freely, solve puzzles, and tackle challenges in any order they choose with a variety of methods for doing so at their disposal. Games such as *The Legend of Zelda: Breath of the Wild* (Nintendo, 2017) and *Metal Gear Solid V: The Phantom Pain* (Kojima Productions, 2015) exemplify this, as both games allow players to be creative and complete areas with strategies that the developers themselves may have never even considered. There are various other methods of using creative strategies to address player needs, each solving potential problems as a result of making key considerations that can impact on the overall gameplay. One notable example is automatic difficulty adjustment scaling, a strategy used in games such as *Left 4 Dead* (Valve) and *Resident Evil 4* (Capcom) so that players are challenged in accordance with their skills, ensuring that the game is never too easy.

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Conclusion

Developers in the rapidly evolving and extremely competitive video games industry can benefit from the effective utilization of different art styles and AI tools, while also using creative expression as a method for making strategic decisions that can both improve and streamline projects. This research has demonstrated through various examples and studies that strategic decisions in these areas can play a key role for not only saving time but reducing costs while still enhancing the overall quality of games. It is also evident that in regard to the topic of art styles, key considerations such as whether or not a photorealistic, stylized or simplified aesthetic is used can play a notable role in the amount of time and resources needed for development. This is why the consideration of an art style is so important, as it can prove useful when trying to influence an overall theme, as well as improve the visual appeal as well as the overall production efficiency required.

AI tools have demonstrated great potential for many automatic tasks involved in a video game's development process, in addition to working as tools to save time and work more efficiently (Lankes & Stockl, 2023). The benefits that AI can offer also have come at an excellent time, as the industry itself is currently struggling with an overworking issue and rising budgets, which is where AI can help due to its ability to cut down on labor costs and speed up production timeline by automating specific tasks. (Othman, 2025). These tools (many of which are free, such as ChatGPT) can be particularly advantageous to indie developers, providing them with a higher chance at developing their dream projects through these tools' ability to offer significant time-saving methods that can still allow for high-quality results (Qin, 2023). By making various tasks easier and more accessible to complete, the benefits that AI tools can offer may very well revolutionize the industry, leading to raised standards without the downside of longer development times and increased product prices (Lee et al., 2023)

Finally, it is worth noting that creative expression will always play a notable role towards maximizing efficiency in games development, as the ability to think outside the box is a valuable skill in the gaming industry. Creative thinking leads to innovative strategies that can determine whether games succeed, which in turn, is why many studios are often motivated into focusing heavily on the long-term value of innovation and its relation to player engagement (Rahimi & Shute, 2021). With this mindset, obstacles can turn into opportunities with the right mindset combined with the necessary skills. Trying new things is obviously a key to discovering new solutions, and methods that work can then be utilized throughout the industry by developers who choose to take inspiration from their peers. Game development has notoriously been part of an industry that has had to deal with new challenges and rising standards, but along with this can come new methods that encourage efficient development practices that can benefit everyone.

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