

AI in Game Design: The Good, The Bad, and The Ugly

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ABSTRACT:

This paper explores the contemporary use of AI in gaming and game design by examining AI's use over generations in games. Through a literature review, the study analyzes AI's evolving use, from being programmed as an opponent to generating visual assets and beyond. The study finds that AI is increasingly used to automate aspects of creative production, especially in visual design. This research not only highlights the use of AI but also addresses ethical concerns related to AI.

KEYWORDS: game design, generative AI, AI and game design, game design history, AI ethics

Minecraft has been the most popular game of all time (Chinnuswamy and Lee). It is known for its simplistic art and exploration-based gameplay that relies on randomly generated maps to enhance the gameplay of its players. This feature is one of the reasons for Minecraft's global popularity; its ability to generate dynamic but unique landscapes customized to individual players makes playing the game non-repetitive and enjoyable. These landscapes are generated using algorithms that create semi-random and fixed biomes in every player's server, making every map different but fair at the same time, without human intervention (Zucconi).

Algorithms similar to the ones used to generate Minecraft worlds are used in countless other scenarios: NPCs (Non Player Characters) in video games, and even AI image generation. With the popularization of AI-powered chatbots such as ChatGPT in 2023, using AI as a tool for manual tasks and sometimes even creative tasks has become commonplace. In the visual aspect, AI can generate high-resolution images within a few seconds after typing out a single prompt. There is no human intervention in creating the actual image, which is why it has become a popular choice for graphics ranging from logos, backgrounds, and even in-game character assets.

The introduction of AI in creating visuals for games has brought both positive and negative reactions. The positive side mainly argues that AI is efficient and budget-friendly, as AI is able to do in seconds what

could take a human artist hours or even days. To add on, AI can create multiple iterations of an image very quickly, and current models are able to mimic human art. However, negative reception about the ethics of using AI art as in-game assets has also risen with the popularity of AI and AI-generated art. To improve the algorithm of an art generator, you need to train the AI model on actual human-made art so that it learns from the given examples. Recently, there was a trend where people would ask ChatGPT to create Ghibli-style variants of photos, such as selfies. This is seen as “stealing art” by many artists, including the co-founder of Ghibli Studio Hayao Miyazaki (NDTV News Desk).

This paper explores the history of how video games were designed, beginning with the first ever video game and moving up to modern games. It describes how AI is used in each era of gaming, its roles in game design today, and the types of reactions that AI use in games spur up in the general public.

THE HISTORY OF GAME DESIGN

Game design has a long history of evolution. When the first known video game, *Tennis For Two*, was developed in 1958 (Brooklyn National Laboratory), it was on display on an oscilloscope, a tool that captures and displays electrical signals. The graphics that were needed were a few white lines and a ball. Since then, game design has evolved over time with new technology that has been released. Specifically, game characters have been changing with the improvement of computer graphics (Kou). Early consoles like Atari and Nintendo were able to display video games in 8-bit, but also in color, leading to the creation of games like *Super Mario Bros* (1985), which feature iconic characters with recognizable designs (Computer History Museum).

A key point in the evolution of game design is the transition to 3D graphics, which gave game developers the chance to bring more creative ideas to life than before. With computers evolving to display more and more pixels on a screen, the expectations for a game’s graphics also increased, with modern computer games now being fully in color with stylized artwork and characters. Modern game companies have their own distinct visual style that makes their games recognizable throughout the world. This can range from a specific style of drawing characters or even characters themselves, like Mario and Pikachu, who are recognizable characters worldwide.

THE EMERGENCE OF AI IN GAME DESIGN

However, the new expectations for modern video games have game developers spending more time on the art and design of the game, which is not only time-consuming but also expensive. This is where AI image generation stepped in. Ever since the rise of ChatGPT’s image generation feature in 2024, AI use has been introduced in the visual aspect of games because of its ability to generate images that would take hours if done by a human in seconds (Lee).

Even before image generation was possible, AI had always been used to a certain level in video games, although it was not used in the graphic design aspects. AI was used as personalized opponents in games such as online chess for years before it was able to generate images on its own. Its main purpose was to be a bot (or Non-Player Character, aka NPC) that read a player’s movements and reacted accordingly and quickly, according to an article by Intellias, a global software company. When battling an AI opponent in a game of chess, you do not need to wait for what may sometimes seem like hours for the AI to make a move. The AI makes a move instantly, saving time efficiently. ChatGPT was released in late 2022 and was used worldwide by basically anyone with access to the internet. It gave users clear and concise answers immediately, something the Google search engine could not do, which was revolutionary and useful; whether it be detailed answers to very specific questions or layouts for a presentation, ChatGPT was able to do everything. This included image assets for logos, art, and even games, thanks to the new image generation feature of ChatGPT.

While the rise of AI tools like ChatGPT has made certain parts of game design faster and easier, this change also brings new challenges, especially for smaller developers and artists. Because AI tools are now widely available, there is growing pressure for developers to keep up with quickly rising expectations in both quality and quantity. In the past, creating a detailed scene or character design might have taken days or weeks, and that was an accepted part of the process. Now, with AI able to generate dozens of options in minutes, some game companies expect their teams to work faster than ever. This can lead to unrealistic deadlines and increased stress on workers who are still doing parts of the work manually, like editing AI art or fixing inconsistencies.

There is also a risk that younger or less experienced developers may rely too heavily on AI without learning the basics of design, coding, or storytelling. If everyone starts depending on AI from the start, it could hurt long-term creativity and skill development in the industry. Because AI can pull ideas from thousands of sources at once, it sometimes creates designs that unintentionally copy or closely resemble existing artwork. This makes it difficult for developers to know whether what they are using is truly original or potentially a legal problem. Game studios that use AI without proper checks could face copyright issues, especially if the AI-generated content is found to include parts of copyrighted materials. As the industry continues to grow, it is important to recognize that while AI is a helpful tool, it should not completely replace the creativity, knowledge, and experience that human developers bring to the table.

THE IMPACTS OF USING AI IN GAME DESIGN

The use of AI in video games brings mixed reactions from players of modern video games. According to an article by Intellias, AI's efficiency is praised for creating detailed art in seconds, which saves both time and money for smaller game companies. To add on, AI's rapid increase in quality in the past couple of years gives developers hope for the future of graphics made with AI. In only a year or two, AI will be not only able to generate artwork but also make entire animations on its own. However, because AI generates images based on data instead of drawing them, mistakes like hands mushing together or shading being incorrect are still visible in the final product despite repeated generations, making it easy to tell that it is AI art. This is particularly evident in AI-made videos where character limbs mush together or disappear completely during a single scene. Therefore, using AI-generated assets in games may make the game look lazily made. According to an article in the Harvard Gazette, some have commented that AI art seems ridiculous and "soulless" for these reasons (Mineo).

In addition to the "soulless" critique that AI images are receiving, ethical concerns about whether the use of AI in work is morally right or not have sparked debates in the past few years. A growing number of companies are beginning to fire human employees and replace their jobs with AI that does the work in less time, which not only sparks backlash but also boycotts. One well-known company doing this is Duolingo, an edu-tech company that creates game-like lessons for language learning. Duolingo has laid off a good portion of its employees over the past few years in favor of AI work that is more time-saving (Korn). However, the "enhanced" AI-generated lessons do not live up to the quality that Duolingo lessons had in the past, as users comment that lessons made in the past year seem cheap and are full of errors. Duolingo Max, a subscription tier for Duolingo powered by GPT-4, does not live up to its \$30 price tag. Like Duolingo, many other tech companies have begun to transform into an "AI-first" company, evaluating new employees on their ability to use AI.

Game companies are also beginning to evaluate employees on their ability to use AI as well. For example, at SuperVLabs, it was observed that staff working in the art department had been trained to use AI tools like ChatGPT to generate visual assets. A significant portion of the game's artwork was created with the help of AI technology. While this can save time and reduce costs, it also raises concerns about originality and job security. Relying too much on AI-generated content might take away opportunities from human artists and reduce the creative input that makes games unique.

Because AI is not able to generate something accurately based on descriptions or references alone, it is usually asked to generate hundreds of different images, which the developers then handpick to use in the game. Despite hundreds of images being generated, however, AI is never able to completely and accurately get a character's details correct, and the details of characters may be slightly off in different artworks of the character in-game. This inconsistency of detail was something consistent for every character in the game, which would not have happened with an art team of humans.

Another issue that comes with the use of AI in game design is the potential loss of artistic identity and style. Many popular games are remembered and loved for their unique art styles that reflect the creativity of the artists behind them. With AI, however, there is a risk that games will begin to look the same. Since AI is trained on existing art and patterns, it tends to blend styles rather than create new ones. This makes it difficult for games to establish a strong artistic identity when relying heavily on AI-generated content. Even when developers attempt to train AI on a specific artist's style, the results often end up looking like an imitation instead of something original.

Additionally, the use of AI to copy or reference specific art styles without permission brings up legal concerns, especially when artists argue their work was used to train these AI models without consent. In the long term, if fewer artists are hired to work on games, there may be fewer people entering the field at all, which could lead to a decline in human-created content across the industry. This change could also impact the kinds of stories and characters being told, since human artists often bring their own lived experiences and perspectives to the table. Without them, games may become more generic and less emotionally impactful. As AI continues to evolve, it will be important to balance innovation with the need to protect creativity and originality.

Conclusion

Some may think that AI has only begun to be used in recent years in video games, thanks to the popularity of gen AI tools such as ChatGPT. However, this is only because AI has very recently become a part of our daily lives with AI-generated summaries and AI features on apps everywhere. Whether it is to act as an opponent or generate assets for games, there is no doubt that AI has had its fair share of use in different aspects of video games over time that may not come to mind at first. AI has always been a fundamental aspect of video game development and design, whether it was in the programming aspect or whether it was used to create in-game art, and will continue to be both a major part of video game creation and our lives.

References

- Yamini, Chinnuswamy, and Yu Hui Lee. "How Minecraft Became the Biggest Video Game in the World." *The Straits Times*, 3 Apr. 2025, www.straitstimes.com/life/entertainment/how-minecraft-became-the-biggest-video-game-in-the-world. Accessed 27 July 2025.
- Zucconi, Alan. "The World Generation of Minecraft." Alan Zucconi, 25 Aug. 2024, www.alanzucconi.com/2022/06/05/minecraft-world-generation/. Accessed 27 July 2025.
- NDTV News Desk. "'Insult to Life Itself': Ghibli Founder Hayao Miyazaki on AI-Generated Art." NDTV, 27 Mar. 2025, www.ndtv.com/world-news/quot-i-would-never-incorporate-this-quot-what-studio-ghibli-039-s-hayao-miyazaki-once-said-about-ai-animation-8021037.
- Kou, Yue. "An analysis of character design in video games." *Communications in Humanities Research*, vol. 14, no. 1, 20 Nov. 2023, pp. 186–191, <https://doi.org/10.54254/2753-7064/14/20230455>.
- "The First Video Game?" BNL, www.bnl.gov/about/history/firstvideo.php. Accessed 27 July 2025.
- "Computer History Museum." Atari's Roller-Coaster Ride, www.computerhistory.org/revolution/computer-games/16/185. Accessed 27 July 2025.
- Lee, Junhee, Jaejun Lee, et al. "Empowering game designers with generative AI." *IADIS International Journal on Computer Science and Information Systems*, June 2023.
- Intellias. "How Generative AI Can Be Used in iGaming." Intellias, intellias.com/generative-ai-igaming/. Accessed 29 July 2025.
- Mineo, Liz. "Is Art Generated by Artificial Intelligence Real Art?" *Harvard Gazette*, The Harvard Gazette, 8 Feb. 2024, news.harvard.edu/gazette/story/2023/08/is-art-generated-by-artificial-intelligence-real-art/.
- Korn, Jennifer. "Duolingo Lays off Staff as Language Learning App Shifts toward AI | CNN Business." CNN, Cable News Network, 9 Jan. 2024, edition.cnn.com/2024/01/09/tech/duolingo-layoffs-due-to-ai.
- "R/Duolingo on Reddit: I Tried One of the New 'Built with Ai' Courses and Quality Seems Poor." Reddit, www.reddit.com/r/duolingo/comments/1kclpxi/i_tried_one_of_the_new_built_with_ai_courses_and/. Accessed 30 July 2025.