

Generative AI in the Gaming Realm A Developer Survey

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Generative Artificial Intelligence (GAI) has significantly evolved, finding applications across various media including game development. This study explored the use of GAI among professional game developers. Through a survey of 21 developers from diverse roles, findings reveal a split in the use of GAI. Half of them do not use it – mainly due to ethical concerns and their perceived lack of necessity. The other half use GAI primarily for prototyping, quick fixes, and brainstorming. Notably, older developers are more inclined to use GAI compared to their younger coworkers, who express more ethical concerns. The findings of the survey stand in contrast to available industry data, as study participants' use of GAI is far more limited than how similar tools are described and discussed in forums such as Game Developers Conference (GDC). Future advancement in GAI tools may change some of the participants' perspective on GAI, and therein its impact on professional game development.

Introduction

There are a lot of different opinions on Generative Artificial Intelligence (GAI) as it has evolved drastically in the last few years (Linkinen, 2024). GAI is also used in a lot of different forms of media such as generating images (e.g. Midjourney, see. Figure 1), code (e.g. GitHub Copilot) as well as text and ideas (e.g. ChatGPT). Users can now also generate sounds and music using GAI (e.g. Suno and Udio). While GAI is capable of helping us create unique and new creations, its more widespread use has also led to it, at times, being difficult to identify what has or has not been created by a human (Grierson, 2023). Linkinen (2024) discusses the challenges and benefits game development can have with the use of GAI. GAI serves as a valuable asset for indie developers and smaller game companies by saving time and enabling the creation of content that could be challenging due to limited resources. How-

ever, he also argues that GAI output typically requires refinement and developers need foundational skills to transform it into good video game assets. Also, Linkinen (2024) explains that it is difficult to achieve consistency across various game elements such as characters, environments, style, and narrative. As GAI has many potential use cases in game development, knowing if and how professional game developers currently use AI tools would help understand the current state of GAI in game development and what the future might hold. The aim of this study then is to answer the question: "How do professional game developers use Generative AI in the industry?". The larger research question also spawns two other questions which are: "How does the use of Generative AI differ between work roles?" and "What are developers' opinions on the use of Generative AI in game development?".

"Perfectly fine during the development, as long as it's replaced before the game ships."

Level Designer, 1-2 years of developer experience

Background

Terms such as AI and machine learning can be hard for non-experts to define properly, and for the purposes of this study, a definition of generative AI will be established based on a colloquial understanding of the word. In this study, generative AI refers to machine learning tools in which generative content, such as code or art, is based on some kind of user-generated prompt. Examples of these tools include ChatGPT, Midjourney, and GitHub CoPilot. Less generative or more back-end-focused tools, such as machine learning systems that improve matchmaking algorithms, are not in fo-

cus as these have received significantly less attention or criticism from players and developers than the content-generating AI tools. Fewer people have an issue with the idea of AI tools improving the underlying technologies of games than they have with the idea of AI tools generating the actual content of games.

“So kinda like googling for reference images, except the images are generated and often flawed.”

Technical artist, 5-6 years of developer experience

There is some information on the use of AI in professional game development available in places such as YouTube and GDC Vault. Most of these come in the form of GDC talks, and quite few of them concern generative AI in the way it has been defined in this study.

In one of these (Dobson et al., 2021) a machine learning engineer shows how an AI system can generate and iterate on a musical melody. The same presenter also discusses and showcases how AI tools can learn from and transfer stylistic content to and from artworks, but does not go into detail about how this would be used in practical game development. Another is a talk by Andrew Maximov, a 3D artist and AI company CEO, who discusses how AI tools can be used for efficiency purposes and demonstrates this by populating a scene with environment assets using simple prompts and inputs (Maximov, 2023). He argues that he intends for it to be used as a time-saving tool to let developers focus on the creative work. He brings up legal concerns and mentions that he is involved with suing a different AI company for training its AI model on copyrighted material. In other talks, however, ethical and creative concerns are barely even mentioned, suggesting either a discomfort with the subject or a disinterest in it. Additionally, in a research article on the use of GAI among interns at a games company, the interns were in general against using GAI in their work, both for ethical concerns surrounding the material the tools were trained on, but also because they doubted the creative value and practical usability of the tools (Boucher et al., 2024).

In summary, there is a fair amount of material online where professionals working in or in proximity to game development discuss and showcase AI technology, but not much of this concerns generative AI in game development. Interestingly, the only GDC talk (Maximov, 2023) where a developer showcases in detail how an AI tool can assist developers with generative content is also the one talk where the ethical and creative concerns surrounding the technology are brought up and addressed.



Figure 1: An image generated by Midjourney AI.

The Study

A survey was designed to gather insights into the usage and perceptions of generative AI among game developers who work professionally in the game development industry. The survey consisted of seven questions covering age, profession, experience with generative AI, and their thoughts on its usefulness.

Participants were recruited from various sources within the Swedish and Norwegian game development community, through associations, mailing companies, and professional networks. Recruitment aimed to ensure a diverse sample of professionals with different levels of experience and expertise in game development. The survey was sent electronically using the survey platform Google Forms. Participants were provided with a brief introduction to the purpose of the survey and were assured of the anonymity of their responses. During the data collection, 21 answers were received in total, including answers from four producers, seven artists, six programmers, three designers, and one sound designer (Table 1). The specific roles of the participants vary, but they have been categorized according to their overarching discipline for the sake of the analysis. Quantitative data collected from the close-ended questions was analyzed using descriptive statistics to identify trends and patterns in the responses from the participants. Qualitative data from open-ended questions was analyzed using thematic analysis to identify recurring themes and insights related to the use of GAI in game development.

All participants who answered the survey were completely anonymous, as well as the company they worked for.

Table 1: Participants in the study

Age	Years of experience	Main role
20-25	<1 year	Level Designer
20-25	1-2 years	Level Designer
20-25	1-2 years	Programmer
26-30	7-8 years	3D Artist
26-30	3-4 years	3D Environment Artist
26-30	5-6 years	3D Environment Artist
26-30	5-6 years	Tech/VFX Artist
26-30	1-2 years	Lead Artist
26-30	5-6 years	Technical Artist
26-30	5-6 years	Senior Programmer
26-30	7-8 years	CTO & Producer
26-30	7-8 years	Senior Programmer
26-30	1-2 years	3D artist
26-30	3-4 years	Programmer
26-30	3-4 years	Game Designer
26-30	1-2 years	Sound Design and Music
31-35	3-4 years	Programmer
31-35	1-2 years	Programmer
35-40	5-6 years	Process Manager
40-	>10 years	Producer
40-	>10 years	Producer



Figure 2: The developer experience and age affect the attitude to GAI. Experienced developers use it more and have a more positive attitude.

Results

The study shows that half of the participants use GAI in their work, while the other half do not. More specifically, 11 participants reported that they have not used GAI when working professionally in game development, while 10 claimed they had. Those who did use GAI for their professional work mostly did it for testing purposes, brainstorming, and to create placeholder assets. They were very clear that even though they used GAI in professional work, the generated content was always replaced before final shipping. Those who stated that they did not use it mostly claimed it was because they did not feel the need for it yet. Some did not want to use GAI as they saw it as some form of theft. There were also developers who found it too cumbersome or difficult to use GAI as it is a whole new toolkit to learn and even if the process of making GAI-generated content turn out well, it was difficult.

Regardless of whether they themselves use GAI, 10 participants were generally positive towards the use of GAI, while four others were positive, but had strong opinions that it needed to be carefully regulated. Four participants had mixed feelings about the use of GAI, and three developers had overwhelmingly negative opinions on it. Some patterns that emerged include the fact that none of the designers reported using GAI, while all but one of the producers did. However, with artists and programmers, it is much more evenly split (Figure 3). In regard to age, every developer over the age of 30 reported using GAI, while younger developers were much less likely to (Figure 2).

A clear pattern that emerges from the survey is that those who are older and have been in the industry the most, have both used GAI more and are more positive about it than those who are younger. One of the older participants stated that “it’s a tool easy to use,

which will make making games easier”, while another claims that as it is a good tool to help generate ideas and make progress faster, it could never replace content created by humans, as it is time-consuming and worthless to spend a lot of time to get the desired result. This is in line with [Linkinen \(2024\)](#) and that output from GAI-tools needs refinement if it is to be used in a final capacity. Another quote from one of the older participants: “It’s the future . . . Get on the train or get left behind”. This indicates the attitude is that a developer needs to be proactive and use these innovative tools to be able to keep up with the industry. Even though there are small disagreements on how GAI should be utilized, all of the older participants in our study do agree that it should be used in some way and it is a tool that needs to be used to keep up with the industry.

Age matters

“It is the future. You can dislike it all you want but it will happen with or without you. Get on the train or get left behind.”

Producer, more than 10 years of developer experience

The majority of participants in the age range 26-30, which was by far the largest age group among the survey respondents, did not use GAI in their work, and none of the respondents in the age range 20-25 reported using it. Meanwhile, every respondent over the age of 30 reported using GAI. Looking at younger

participants' reasons for not using GAI and their opinions on it, their responses are fairly long, and recurring themes include AI tools' lack of creative specificity as well as ethical concerns regarding the training data. Older participants' responses paint a different picture, as they are shorter, and describe AI tools as neutral, or even inevitable tools that developers should embrace; perhaps with caution. Even among younger developers who do use GAI in their work, ethical or creative discussions are commonplace in their survey answers. This is an interesting contrast that seems to indicate a deeper moral and philosophical engagement with the question of GAI among younger developers than with older ones. One explanation for this pattern may be the increased availability of academic game development education over the past 20 years, which may see a greater number of younger developers apply societal and ethical perspectives on current issues than their older colleagues, who are less likely to have an academic education in games. Another possible explanation may be larger societal patterns, which include younger people's anxiety about the future, and how this makes them more likely to be suspicious of new technologies pushed by corporations. Another explanation may be that older developers have more experience with disruptive technologies appearing during the course of their careers and have learned not to be concerned about them. This idea relates to yet another possible explanation by Maximov (2023), who argues that AI tools do not raise the bar, but rather raise the floor, and that senior developers who are working on a high level do not need to be concerned about their roles being infringed upon by AI, since it can not and is not intended to perform those duties.

“Trying to get the AI to generate what I want has been more of a hassle than just finding similar things on Pinterest, so I have opted not to use it.”

Level designer, less than a year of developer experience

Role of roles

In regard to respondents' work roles, there is both mixed usage and mixed opinions on the use of GAI. The one sound designer and music composer among the respondents did not use GAI. The respondent did not use GAI, reasoning that they did not find it useful at this time. None of the three game and level designers used GAI. Two of the designers explained that they just have not found a use case for GAI in their work and that as far as a placeholder or inspirational material goes, they find it easier to ask their artist colleagues or search for assets online. The third designer

simply had not gotten around to trying GAI-tools, but stated that it might be helpful with programming for prototypes. It makes sense that since the most well-known and widely available GAI tools tend to focus on code, art, or writing, they are not directly applicable to many of the designers' duties, such as level design or iterating on ideas. More specialized or engine-integrated tools, like the one showcased by Maximov (2023), might change this in the future.

“I brought up the potential of using Midjourney / Stable Diffusion for things like moodboards and there were some strong opinions against it from our art team.”

Programmer, 3-4 years of developer experience

For artists, four out of seven used GAI. Based on their comments, those who do not use GAI have a fair amount of ethical concerns with the technology, such as how it is trained on work from other artists. From their point of view, GAI steals other artists' work and then claims it as its own. Many artists are also concerned with creative degeneration if companies start delegating artistic duties to AI-tools. From the comments of the artists who do use GAI, it seems they think it is okay to use it when generating inspirational artwork such as mood boards, but they are in general similarly skeptical of its wider use.

Three out of six programmers use GAI. Those who do not use GAI seem not to use it because they claim they could do a better job in a shorter time themselves. Their work often needs more complex tinkering and setup, which GAI has not proved itself to be able to do for them. In addition, among both GAI users and non-users, some programmers state that GAI-tools have often given them incorrect answers, and are therefore somewhat unreliable. One non-user simply said they did not have the energy to learn a new tool. Among the programmers who use GAI, they argued that it is useful for creating the basis of systems, condensing large amounts of information, and quickly getting assistance with a problem but universally warned that it should be used with care as it can make mistakes and its output usually needs to be corrected and adjusted.

“It's faster than Stack Overflow for basic things you don't keep in memory.”

Programmer, 3-4 years of developer experience

Producers seem to use GAI more than the other roles, as three out of four producers use it for their



Figure 3: The use of GAI differs between developer roles.

work. The one producer who did not want to use GAI called it the mind-killer and the destroyer of creativity and had a strongly negative opinion on the use of GAI. The three other producers, however, were positive about the use of GAI in the game development industry. They mentioned it helps with brainstorming and generating pitches, and one even stated that using it was a prerequisite for being able to keep up with the industry; if you do not use it, you will be left behind.

“The generative AI space is shady and not something that I want to associate with if I can help it.”

Tech/VFX Artist, 5-6 years of developer experience

Discussion

The results of the study show that the use and opinions of GAI among the surveyed developers are quite disparate. In addition to the data showing that almost half of the respondents use GAI, the clearest themes that were identified were as follows: younger developers were generally more skeptical of GAI than their older colleagues; most developers who do not use GAI do not have a negative perception of it; no developers reported using GAI for anything other than brainstorming, inspiration, and early or placeholder content; and most users of GAI cautioned against using it for other purposes. The reasons developers gave for not using GAI were overwhelmingly a lack of practical use

cases, with several also calling into question the ethics of using other artists' work as training data and the potential creative pitfalls with the technology. The type of content that widely available GAI-tools can generate seems to play a significant part in which work roles use them, as GAI-tools seemed to be useful to producers, programmers, and artists through the generation of code, art, and text but were not useful to the participating designers. The results of the survey stand in contrast to the observed GDC-talks, as in those talks, AI-tools are presented as heavily integrated into developers' workflows and able to generate large amounts of high-quality content, while in the survey, developers reported only using GAI-tools for placeholder or brainstorming purposes. Future distribution of more specialized or robust GAI-tools may change this.

The fact that the study only includes 21 respondents from Norway and Sweden hurts the results' generalizability but still allows for valuable insight and indications to be gleaned from the study. As there was only one participant in the survey who worked with sound and music it gives a very limited coverage of this important field. Generative AI tools available for music creation were not discussed at all by this only respondent. If we had more responses from sound and music designers, we could get a clearer image of what their opinions on GAI are.

The game development industry is somewhat poorly researched in many areas (Engström, 2020), and it can appear opaque to outsiders and aspiring game developers. If GAI is to become an integrated part of game development practice going forward, it is important to aspire to understand its use and relevance within game development from an early onset, to not let it become a source of mystery and misunderstanding. Future research could explore the question of the use of GAI in game development further by increasing the reach and sample size of a similar study so that it includes a wider demographic. Specific issues worth looking closer at include the relationship between studio size and how AI-tools are used and implemented, as well as investigating the ethical implications and developing guidelines for the responsible use of GAI in the industry.

References

- J. D. Boucher, G. Smith, and Y. D. Tellié. Is resistance futile?: Early career game developers, generative ai, and ethical skepticism. In *CHI Conference*, 2024.
- W. Dobson, J. Booth, and D. Lange. Beyond bots: Making machine learning accessible and useful, 2021. URL <https://www.youtube.com/watch?v=P6FcpDCVvJQ>.
- H. Engström. *Game development research*. University of Skövde, 2020.
- J. Grierson. Photographer admits prize-winning image was ai generated, 2023. The Guardian, Mon 17 Apr 2023.
- T. Linkinen. Generative artificial intelligences: Challenges and benefits for game development, 2024. MSc Dissertation, Tampere University.
- A. Maximov. Creative future with artificial intelligence, 2023. URL <https://www.youtube.com/watch?v=f0qLuWml0UY>.

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Please visit the GTA website: gametechacademy.dk

The figures have been generated using Midjourney. The challenge with flaws in this type of generation is, for example, apparent in the markings on the dice in Figure 3.

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