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The Role of AI Chatbots in Revolutionizing Gaming Experiences – A Survey

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Abstract

This paper investigates the integration of Artificial Intelligence (AI) chatbots into video games to improve the gaming experience. In the realm of modern entertainment, video games suffer from the constraints of linear storytelling, limited replayability, and more personalized game experiences catered to their own needs. To solve these issues, this study proposes the idea of implementing AI chatbots into games by testing and studying the impact of existing games that use AI chatbots as a main feature. To have a better understanding of AI itself and video games, the literature review explores the previous research done in these fields. This research assesses key features of free and open-sourced games, such as game type, engine, platform, AI capabilities, player engagement, NPC (non-playable character) behavior, visuals, and identified issues, to create a thorough analysis of AI chatbot functionality. Using this data, the paper also discusses the comparison of AI chatbots with traditional chatbots highlighting which system is better to implement in video games. The paper concludes with the advantages and limitations of using AI chatbots and discusses further research possibilities in the field of AI chatbots and video games.

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1 Introduction

Video games have become an integral part of modern entertainment, offering immersive worlds, engaging narratives, and limitless opportunities for exploration and adventure for players to enjoy [1]. Despite the advancements made in gaming technology, a prevalent challenge still exists which is that many games still have a linear narrative structure, limiting replayability and having no potential for unique player experiences. To address this challenge and improve the gaming experience to new heights, the integration of artificial intelligence (AI) chatbots into video games becomes promising for this challenge and a key to video game innovation [2].

A chatbot is a software program designed to emulate and mimic human-like conversations with end-users [3]. This interaction involves the users' queries as input, which are then translated into a computer language by the program. The chatbot then generates results based on this language, and the outputs are con-

verted back into user-readable language. While initially limited to answering just Frequently Asked Questions, chatbots have changed dramatically over time, utilizing machine learning and technology breakthroughs. Modern chatbots, such as ChatGPT [4] from OpenAI, use conversational AI techniques like natural language processing and keyword-based responses to create dynamic and accurate results.

ChatGPT [5] , along with other notable AI chatbots like Google Bard [6], utilizes natural language understanding to generate diverse responses like human nature in response to various user queries. These responses can be of a wide variety, ranging from translations, coding assistance, and general discussions to grammar and typing corrections. The training process for AI chatbots typically involves utilizing content from human-written websites, posts, and articles on the World Wide Web. This approach allows the chatbot to gain insights from extensive datasets, enabling it to formulate complex responses [8].

This research paper explores the transformative potential of AI chatbots within the gaming landscape, focusing on dynamic interactions, personalized storylines, and modern gaming environments. The paper thoroughly examines specific features, including the creation of AI-powered non-playable characters (NPCs) and enemies, dynamic adaptation of storylines and objectives based on player interactions, everchanging game objectives, and the establishment of non-linear gaming experiences.

In the following sections, we focus on a detailed exploration of the transformative potential of AI chatbots in gaming, investigating their impact on dynamic interactions, personalized storylines, and game-level environments. Our research focuses on specific features, including the creation of AI-powered non-playable characters (NPCs) and enemies, dynamic adaptation of storylines based on player interactions, and the establishment of non-linear gaming experiences. The subsequent literature review, research methodology, and data analysis sections aim to provide an in-depth understanding of the implications and applications of AI chatbots in the gaming realm.

2 Literature Review

Artificial intelligence (AI) chatbots can significantly improve the user experience by allowing for dynamic and customized interactions in video games. Recent studies explore the complex effects of AI chatbots, emphasizing how they could transform video game storytelling, dismantle established narrative boundaries, and usher in a new age for traditional gaming narratives. With the potential to provide players with a more immersive and interesting experience, these developments have enormous potential for the future of video gaming.

Researchers, such as Cavadas (2022), envision AI bots trained through imitation learning, fostering genuine connections with players by exhibiting responsive and adaptive behavior [1]. This perspective aligns with Zhai's (2023) exploration of ChatGPT's potential to revolutionize education through personalized, dynamic interactions [4]. However, Yin and his team (2023), after testing different Artificial Intelligence-based games, caution about technical hurdles, including computational demands and API accessibility, which must be addressed for these dynamic dialogues to flourish [7].

Kyzyrov and Sapakova (2023) showcase the diverse functionalities of AI chatbots, emphasizing their potential to power various narrative experiences within games [8]. Rosmalen (2012) demonstrates this potential through "EMERGO," a rule-based chatbot weaving unique stories driven by player choices through Natural Language Processing (NLP) [9]. Antony (2023) further advocates for AI's role in enriching narratives, diversifying NPC behaviors, and empowering player agency, thereby breaking free from linearity and co-authoring stories with players in real-time [10]. Xihui Wang and his team (2024) discuss how ChatGPT can be used as a versatile Decision maker in various software-based technologies which can be applied to video games as well [11].

Ethical concerns about using AI chatbots are highlighted by Bhorge (2023), who acknowledges the benefits of chatbots in customer service while pointing out the issue of AI having access to user data and the AI itself taking over human jobs [12]. OpenAI API docu-

mentation [13] showcases that the ChatGPT chatbot can be easily implemented in any software program. In his research, Yin (2023) discusses a similar method that developers can use to place AI chatbots in their games [14]. Similar research on utilizing the ChatGPT AI chatbot is done by M. Charfeddine where they analyze the security risks of this software tool as well [15].

Tsihrintzis (2021) emphasizes the necessity of further research to address these challenges and ensure the ethical, player-centric development of AI-powered game narratives [16].

Riedl in 2011, discussed the hypothetical idea and layout of integrating Artificial Intelligence as a non-playable characters' chat system [17]. He and his team later, in 2021, proposed a framework for using Artificial Intelligence to create interactive storytelling for the video game player [18]. In a study conducted by Trichopoulos in 2023, various algorithms were employed to survey digital stories and literature available on the web [19]. The research highlighted how AI chatbots and other artificial intelligence systems can read and adapt story structures, contributing to the creation of a dynamic and comprehensive narrative environment.

Similarly, researcher T.Lalwani and his team pointed out that implementing an AI chatbot instead of creating a chatbot can improve the user experience on college websites as the AI system can guide users on the website more easily and provide a more personalized experience [20].

While it is useful to implement AI chats in software from a technical perspective, it is also important to note how the general public will react to this new technology. In her research, N. Aoki surveyed to see how much the public trusts AI chatbots and found that the results were mixed at best with the younger generation more willing to trust the new technology [21]. Another research done on user trust in Artificial intelligence in the medical sector was done by M. Hengstler and showcased similar results [22]. This data can be advantageous as most gaming users consist of the younger generation.

Chatbots in video games are doing more than just improving the gaming experience; they're fundamentally changing the way game stories are told. Their ability to adjust gameplay, tailor storytelling, and involve players in evolving conversations represents a significant change. Overcoming technical and ethical hurdles, exploring new research, and emphasizing player involvement can unlock the complete potential of these chatbots. This can lead to genuinely immersive, player-driven experiences that reshape the core of video games.

3 Research Methodology

This research adopts a comprehensive approach, combining an in-depth literature review with practical experimentation. This dual strategy aims to thoroughly investigate the transformative potential of AI chatbots in the context of video games. To have a strong background and understanding of AI chatbots and their uses in video games, this research paper showcases and discusses the previous research work done on this topic in the literature review. Papers that simply discuss AI chatbots and Artificial mechanisms in games are also highlighted as they provide as insight into how AI chatbots can be implemented in Video games. The selected research papers were selected from reputable sources including IEEE, Elsevier, Google Scholar, ResearchGate, and Science Direct. Papers that were published in the last decade were given priority to keep the research up to date.

For the experiment section of this research paper, the process was divided into 4 steps which are Data Collection, Feature Selection, Analysis and Categorization, and a Comparative analysis with non-AI chatbot games (Figure 1). This is done to ensure that the dataset created and analyzed showcases clear results which will provide context to Comparative Analysis and create a proper conclusion. The layout of the experimentation section was inspired by previous research work done by M. Carrión (2019) on comparative analysis of Video Game characteristics [23], and Game accessibility and engagement analysis written by M. E. Larreina-Morales (2023) [24].

The experiment section of this research paper is divided into four steps: Data Collection, Feature Selection, Analysis and Categorization, and Comparative

analysis with non-AI chatbot games (Figure 1). This division ensures that the dataset created and analyzed presents clear results, which will provide context for the Comparative Analysis and lead to a proper conclusion.

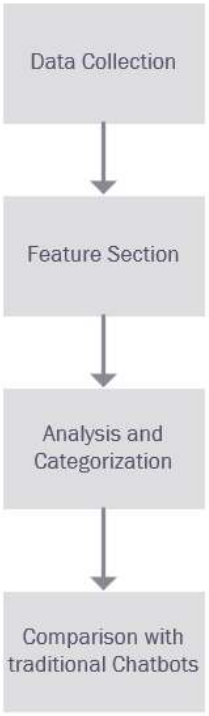

Figure 1. Procedure of Research Methodology

4 Data Collection

For the **Data Collection** phase, we selected specific video games that showcase the use of AI chatbot as a main feature. The selection process primarily focused on sourcing games from itch.io, a vibrant platform known for its diverse range of indie games. Most of the chosen games were taken from this platform, providing a large dataset of contents for our study.

It is to be noted that the majority of these games were released in 2023, with many being demos. This timeframe shows us the latest developments in the integration of AI chatbots within video games, offering valuable insights into emerging trends and innovations. All the selected games were tested on a Windows Computer to ensure uniform testing conditions.

To maintain the integrity and focus of our study, certain restrictions were applied during the game selection process. Games featuring explicit political content, nudity, or extremist themes were purposefully excluded to ensure the examination remained focused on the core feature of AI chatbots in gaming experiences.

Additionally, games that were made using AI models like "ChatGPT" by generating code and assets were also excluded from consideration. While these games undoubtedly showcase the capabilities of AI, this research is aimed to explore the direct influence of AI chatbots on gameplay dynamics and player engagement only, rather than the broader spectrum of AI-assisted game development.

5 Feature Selection

After selecting the games that use AI chatbots in their systems, the features of each game are discussed. The features selected were based on the following factors:

- **Game Type:** The genre or type of game the AI chatbot is integrated into, such as role-playing games, first-person shooters, or strategy games.
- **Game Engine:** The game engine used to develop the video game and how well it supports the integration of AI chatbots.
- **Platform:** The platform on which the video game is played, including PC, console, or mobile devices.
- **Feature of Chatbot AI in the game:** The specific features and function of the chatbot in the game such as the narrator, NPC dialogue, or movement.
- **Player Engagement:** The level of immersion and enjoyment experienced by players when interacting with AI chatbots within the game.
- **Non-playable Character (NPC) Behavior:** The responsiveness, realism, and adaptability of non-player characters controlled by AI chatbots in the game.
- **Game Animation and Visuals:** If the game features animation or visuals to enhance the gameplay experience.

- **Drawbacks and Issues Identified:** Any potential drawbacks or issues that arise from the use of AI chatbots in video games, such as technical glitches, repetitive dialogue, or unpredictable behavior.

6 Analysis and Categorization

This phase of the study aims to assess the impact of AI chatbots in video games on player experience. Through a series of test studies on selected video games that have integrated Artificial Intelligence (AI) chatbots, we collected a dataset encompassing game type, game engine, chatbot AI features, player engagement, NPC behavior, game animation, and visuals, as well as identified drawbacks or issues. These are the following games selected for the analysis of AI chatbots:

1. *Terrible Story Atrocious Adaptation* [25]
   This game was published by some-games-by-bee on November 7th, 2023. In this game, the player has to defeat hordes of skeleton enemies and find the "Incredibly Rare" Crown to beat the game. Players can move the character across the map and pick up items by typing in the AI chatbot in the game.
2. *Open AI Visual Demo* [26]
   This game was created as a demo to showcase the capabilities of the Complete OpenAI API plugin [27] in Unreal Engine 5. Published by Life EXE in December 2023, the game lets the player take screenshots of various objects in the room which the game then provides (text and audio) information about the object.
3. *AI Dungeon* [28]
   Created by the company Latitude, AI Dungeon is a text-based game, where players get to experience new worlds and characters via the power of AI-based text generation. Players can experience all sorts of adventures, from cyberpunk to pirates, with each adventure offering different storylines and NPCs that players can connect with.
4. *NeuroTown* [29]
   A prototype game that was created by user RetroValuo on July 21st, 2023, this game features an open-world setup where the player must find their "friend" by talking to unique and quirky NPCs. Player needs to explore the city and talk to NPCs to get hints about where their friend is located.
5. *PawPorter* [30]
   PawPorter is a simple 'complete-the-quest' kind of game, created by Wolfo Dev on 8th, April 2023. The game uses ChatGPT to create infinite quests for players to try and finish them.
6. *Inworld Origins* [31]
   This game was created in collaboration with John Gaeta, the Academy Award Winning Creator, and published by Inworld AI on 27th July 2023. The 1-hour game was designed to showcase how using AI NPCs can Revolutionize the gaming space. In this game, the player gets to explore the city of Metropolis (where humans and robots) as a lead detective to solve a murder mystery and try to find the culprit. The player can find clues by talking to various NPCs to get clues and crack the case.
7. *Elkridge* [32]
   This game was published on June 27, 2023, as a Final-Year-Project project by the creator Firewalk (Maria Shchurova). The game is a life-simulation game where the player's goal is to interact with 4 other NPCs in the town of Elkridge. Given how the player interacts with these NPCs, they can either become the player's friend or their enemy.
8. *Therapy with Elizabeth* [33]
   Known as "ChatGPT Therapy Voice Chat" on itch.io, this game was published by Tamulur on 23rd April 2023. In this game, the player attends a therapy session with the (AI-powered) Elizabeth while watching their selected YouTube videos in the background. The game allows the player the option to type or directly speak to Elizabeth who similarly talks back to you.
9. *Coldfront* [34]
   Published by eakka on 31st, January 2023, Coldfront is a text-generated game in which the player is tasked to rebel against the corrupted "Niraxus

Mining Corp" and find ways to stop the company and save the world.

10. *Should you help* [35]
    This game was created for GameDev.tv Jam 2023 by PickentCode on 29th May 2023. The game allows players to team up with an AI companion in a 2 player-cooperative game. Both AI and the player need to move their characters, dodge obstacles, and reach the goal to win the game.

All chosen games are free to play or open-sourced and were predominantly tested on a **Windows** computer.

Table 1. Summary of the List of Games that are being tested.

S.no	Name	Engine
1	Terrible story atrocious adaptation	Godot
2	Open AI Visual Demo	Unreal Engine 5
3	AI Dungeon	Python
4	NeuroTown	Unity
5	PawPorter	Unity
6	Inworld Origins	Unreal Engine 5
7	Elkridge	Unity
8	Therapy with Elizabeth	Unity
9	Coldfront	Unreal Engine 5
10	Should you help	Unity

Each game was created on a different platform, as illustrated by the accompanying pie chart /.

As outlined in the research methodology, game data was tabulated using parameters such as game type, game engine, platform, chatbot AI features, player engagement, NPC behavior, game animation, visuals, and identified drawbacks or issues. Player engagement was scored on a scale of 0-5, with 5 indicating the highest level of immersion and enjoyment.

Table 2 shows the various game engagement details at different levels. Each level indicates how well with the game will perform in digital market place, when compared to other games.

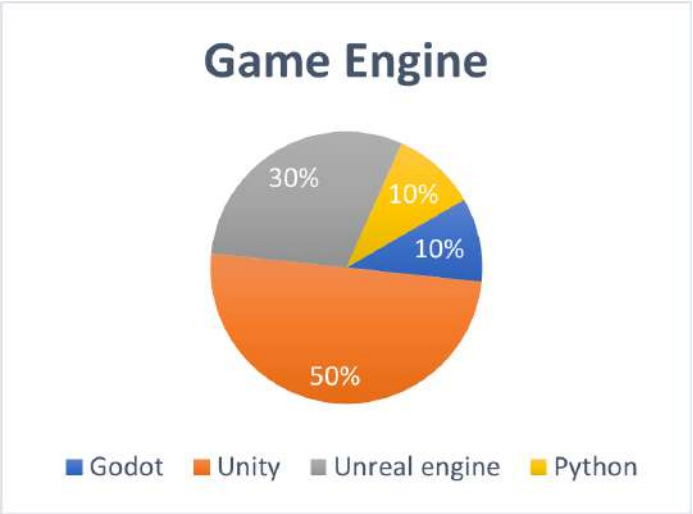

Figure 2. Pie chart of platform used to create games.

Table 2. Engagement levels and its Details

Level	Engagement Details
0	The Game looked and played terribly. (Or the Game was too broken to work)
1	The game functions fine but lacks visual appeal and functionality.
2	The game functions well but it will not hold the attention span of players.
3	The game functions well and has decent visuals and gameplay but nothing unique that can engage players to try the game.
4	The game has good graphics, gameplay, and design that can attract players to test it out.
5	The game has excellent storytelling, visuals, and gameplay that can keep the player engaged until the game ends.

Table 3 and Table 4 shows the complete features of games and the game features being discussed. Note that column heading "engage" refers to "Engagement".

Table 3. Games listed by Name, Type/Genre, Platform, AI feature, Engagement, NPC Behavior, Visuals, and Issues. Part 1.

Name	Type/Genre	Platform	AI feature	Engage	NPC Behavior	Visuals	Issues
Terrible story atrocious adaptation	Adventure	Browser	The AI reads the movement prompted by the player	4	An AI narrator creates the story as the player progresses	2D	None
Open AI Visual Demo	Exploration	Windows	Describes the images	3	None	3D	To play this game the user should have access to the OpenAI API key.
AI Dungeon	Adventure	All platforms	Creates text-based stories on any genre for players to engage with.	3	The dialogue and actions (through text) are controlled by the AI chatbot	None	The game is not completely free. After a certain number of prompts, the game asks for payment
NeuroTown	Simulation	Browser and Windows	Provides NPC dialogue and player missions.	4	The dialogues of NPC are handled by the AI chatbot, which provides clues to where to find the game objective	2D characters in 3D space	To play this game the user should have access to the OpenAI API key.
PawPorter	Adventure	Browser and Windows	Provides NPC dialogue and player missions. Also used to generate collectibles	3	The dialogues of NPC are handled by the AI chatbot, which provides clues to where to find the game objective	3D	To play this game the user should have access to the OpenAI API key.
Inworld Origins	Simulation, Mystery	Windows	Converts player speech to texts so NPCs can interact with the player. Also Manages the NPC interaction and dialogue system	5	NPCs fully respond to the spoken questions by the player and provide hints and clues to find the criminal.	3D	The speaking factor is not the best. The game sometimes misinterprets user input
Elkridge	Simulation	Windows	Provides NPC dialogue and player missions.	4	NPCs talk with the player in text prompts (using ai chatbot)	3D	To play this game the user should have access to the OpenAI API key.

Table 4. Games listed by Name, Type/Genre, Platform, AI feature, Engagement, NPC Behavior, Visuals, and Issues. Part 2

Name	Type/Genre	Platform	AI feature	Engage	NPC Behavior	Visuals	Issues
Therapy with Elizabeth	Simulation	Windows	Converts player's dialog into text and uses AI chatbot to respond. Also uses text-to-speech to talk	3	Most of the dialog from NPC Elizabeth is generated from the AI chatbot.	3D	To start this game player needs to find the configuration file and input the API key themselves
Coldfront	Simulation	Windows	Uses the open image generator and text prompt to create story and visuals. Also provides 4 options for players to choose from.	2	An AI narrator creates the story as the player progresses	2D (images)	None
Should you help	Adventure	Windows and Browser	Controls the game character and guides the player	0	None	2D	The AI prompter did not work most of the time citing the error: system overloaded.

The analysis of different games reveals that AI chatbots are mostly used in text-based or narrative-guided games. Games like AI Dungeon and Coldfront function as text prompt generators, creating scenarios for players to respond to, thereby initiating unique storylines. Notably, these text-based interactions can be replicated easily on ChatGPT's online platform without necessitating a standalone game. Coldfront, in contrast to AI Dungeon, still tries to elevate the gaming experience by integrating visuals, such as images, to illustrate monster battles and character development

7 Discussion And Comparative Analysis

Even though the game is a demo, the visual showcase crafted by "OpenAI in Unreal Engine" goes beyond expectations, illustrating the robust capabilities of integrating AI chatbots into gameplay. Through image input, the game not only generates distinct responses to each picture but also incorporates text-to-speech functionality from the OpenAI platform, allowing the AI chatbot to respond verbally to the player.

Figure 3. Gameplay of Unreal OpenAI demo

Games such as "Pawporter", "NeuroTown", and "Elkridge" take advantage of AI chatbots to create a more immersive gaming experience by assigning unique missions to players, creating interactions that mimic human-like engagement. In the case of "Terrible Story Atrocious Adaptation," the AI chatbot assumes a management role, enabling players to direct their character's movements and actions while serving as the narrator, guiding them through the unfolding adventure.

"Inworld Origins" fully utilizes the AI chatbot features in its gameplay, functioning as both a robot companion that guides the player and as talkative NPCs for players to interact with. This unique implementation offers players guidance, support, and interactive conversations throughout the game. The introduction of player speech interaction with NPCs, responsive to the AI chatbot's programmed behavior, provides a dynamic game layout, resulting in diverse storylines for the murder mystery case in each gameplay where every victim or murderer is a different character.

While not exactly a game, "Therapy with Elizabeth" takes a different approach by employing speech integration for therapeutic conversations with an AI chatbot named Elizabeth. Utilizing OpenAI's text-to-speech feature, this non-game provides a personalized and engaging experience fit for its player's needs.

The game "Should You Help" presented notable issues during game testing, frequently encountering an "overloaded system" error, which hindered comprehensive testing and underscored the complexities involved in seamlessly incorporating AI chatbots into certain gaming scenarios.

8 Comparative Analysis Of (Artificial Intelligence) AI Chatbots VS. Traditional Chatbots

In the world of video games, a chatbot system is crucial for narrative-driven games. As such both AI chatbots and traditional chatbots are considered a very important feature in the Game development world. As players engage with these digital conversationalist systems, the stark contrasts in their strategies and strengths become apparent, painting a fascinating picture of their impact on the gaming experience.

In terms of adaptability, AI chatbots have a greater advantage, showcasing unparalleled flexibility and dynamism. In contrast to the script-bound nature of traditional counterparts, AI seamlessly adapts to any player input and in-game mannerism, offering a level of immersion seen in games like "Pawporter," "NeuroTown," and "Elkridge." These AI-driven not only provide unique dialogues for chatting; they also generate unique missions, fostering deeply immersive interactions that captivate the player's attention. "Inworld Origins" stands as a good example of AI chatbot adaptability, employing speech-to-text technology to unlock open-ended dialogues, empowering players, and intensifying their connection to the virtual world.

However, this dynamism is not without its challenges. The occasional glitches in "Should You Help" highlight how difficult it is to maintain a smooth balance of seamless gameplay. Traditional chatbots avoid potential system overloads by providing stability and predictability in contrast to the thrill that AI brings. The financial environment also poses a challenge because some supposedly "free" AI games may need users to acquire API keys which require money to purchase and use.

Traditional chatbots, despite their structured and predictable nature, still play a major role in the gaming narrative. Visual novels such as "Ace Attorney," "Doki Doki Literature Club," and "Raging Loop" incorporate traditional chatbots as core mechanics, where players navigate through complex dialogue systems, influencing storylines through choices and unlocking multiple endings [36]. Despite the branching paths offered, these games often follow linear structures, concluding the gameplay in the end once all endings are unveiled.

Similar to its AI counterpart, traditional chatbots also play a vital role in NPC interactions, providing quests, storylines, and choices that move the narrative forward. However, the implementation of traditional chatbot systems demands considerable developer effort. From script creation to dialogue placement and object integration, each step consumes valuable resources, game memory, and development time. This stark difference with the dynamic adaptability of AI highlights the distinct nature of each technology.

In conclusion, the choice between AI and traditional chatbots depends on what kind of game is being created and how many resources have been assigned to its development. Both systems possess unique strengths and weaknesses, and the goal remains to craft engaging conversations that enhance player immersion and drive the narrative forward, irrespective of the technology being used. The gaming

landscape, with its ever-evolving technologies, encourages developers to carefully consider these factors in their quest to create captivating and immersive gaming experiences.

Table 5 shows the summary of the comparative analysis of AI Chatbot and Traditional Video Games

Table 5. Comparison of AI chatbots with Traditional chatbots.

Feature	AI Chatbots	Traditional Chatbots
Adaptability	Highly flexible, respond dynamically to player input	Rigid script-based interactions
Immersion	Creates dynamic worlds and open-ended conversations	Offers intricate narratives with multiple endings
Player Agency	Empowers players to shape the story through choices	Less focus on player agency follows predefined storylines
Technical Challenges	Prone to glitches and technical issues	More stable and predictable
Financial Costs	May require additional API key purchases	Typically no additional costs beyond development
Development Effort	Lower development burden	Requires significant script creation and dialogue placement
Ideal for:	Open-world exploration, dynamic quests, immersive experiences	Linear narratives, complex storylines, branching paths

9 Limitations

It is important to note that given only one researcher was involved in the experimentation, this paper's outcomes and analysis suffer from limitations. The overall dataset of the paper is limited as well because paid video games were not included as a part of the testing. These limitations mean the result concluded may not be indicative of how AI chatbots truly behave in video games and further refinement and research can be done to have better results.

10 Conclusion

The idea of incorporating Artificial intelligence (AI) chatbot technology into the realm of video games holds significant appeal in improving the overall user gaming experience. While it is still a relatively new technology, adding AI chatbots into video games can provide a range of benefits including never-ending and unique missions, interactive conversations with Non-playable Characters (NPCs), and in-depth personalized guidance to the players. From a developer's perspective, the addition of using AI Chatbot in their games, rather than creating one from scratch, not only saves time, resources, and money but also fosters innovation.

However, like all good things using AI Chatbot is not free. To use the AI chatbot feature, the developer or user needs to purchase its API keys, whether or not the game itself is free. This means that to guarantee widespread accessibility and user acceptability, AI chatbots must be implemented with careful consideration in future games or any other software application.

Further research can be done to refine the reliability and performance of AI chatbots within video games by future researchers. This involves addressing the challenges and issues of using AI chatbots, such as technical errors repetitive dialogue, AI misunderstanding the user, or removing the need for API subscription-based costs, to improve the overall user experience. Additionally, even more applications and features can be explored and created in this field. One of which can be the manipulation of in-game coding to modify levels.

Author Contributions

Natalia Khan: Conceptualization, Methodology, Software. **Nosheen Sabahat** : Visualization, Investigation.

Compliance with Ethical Standards

It is declared that all authors don't have any conflict of interest. It is also declared that this article does not contain any studies with human participants or animals performed by any of the authors. Furthermore, informed consent was obtained from all individual participants included in the study.

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