DYNAMIC WORLDBUILDING IN VIDEO GAMES

Understanding the impacts of dynamic worldbuilding on the player's immersive experience in video games

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Abstract

Digitala videospel representerar en mångsidig form av interaktiv underhållning som blandar konst, berättande och teknik för att skapa uppslukande virtuella världar. Världsskapande i videospel ger oss karaktärer som vi kan relatera till, berättelser som fångar vår uppmärksamhet, samt uppmanar oss att utforska och fördjupa oss i spelvärlden. Genom att lyfta fram betydelsen av dynamiskt världsskapande, där spelelement påverkas av - eller oberoende av - spelarinteraktion, fokuserar denna studie på att utforska vilken inverkan dynamiskt världsskapande har på spelarengagemang och användarupplevelser i digitala videospel. Studien har samlat in data från 48 användare via en enkät, inklusive två spelanalyser, som tillsammans stödjer tesen att relevanta faktorer inom dynamiskt världsskapande avsevärt påverkar spelarens engagemang och känslomässiga inlevelse i digitala videospel.

Table of Contents

1. Introduction

Video games is an interactive entertainment media that includes a wide range of genres, styles and platforms. Not only do video games provide immersive experiences, but they also serve as a platform for creative expression, social interaction and even educational purposes. Fundamentally, video games combine art, storytelling, and technology to create engaging virtual worlds where players can encounter diverse narratives and challenges.

Worldbuilding, or dynamic worldbuilding which this study mainly focuses on, refers to a world that evolves, reacts or adapts to various factors such as player actions or passage of time. As opposed to static worldbuilding where the game world remains largely unchanged regardless of player interaction. This study aims to answer the question of how dynamic worldbuilding makes user experiences in video games more immersive. Moreover, it seeks to explore the concept of immersion and its meaning in relation to worldbuilding, as well as to examine how key elements within worldbuilding – such as environmental behavior, random encounters, lore exposition and non-playable character (NPC) interactions – contribute to fostering immersive experiences for players.

We hypothesize that dynamic worldbuilding in digital video games significantly influences players' engagement and immersion. Specifically, we predict that video games featuring dynamic worldbuilding elements, such as simulation and interactive NPCs, will result in higher levels of player engagement compared to games with static environments. Furthermore, we anticipate that dynamic worldbuilding will enhance player immersion by providing a more interactive and realistic game experience, thereby fostering deeper player involvement and emotional connection with the game world. Overall, we expect our research to demonstrate a positive relationship between dynamic worldbuilding and players' engagement and immersion in video games.

1.1 Purpose & research question

The purpose of our thesis is to investigate and analyze the importance of dynamic worldbuilding in digital games in relation to the player's experience. We want to understand how specific factors of dynamic worldbuilding – such as environmental behavior, random encounters, lore exposition, and non-playable character interactions – affect and improve player engagement and immersion in video games.

Our objective is to identify patterns and deviations between dynamic elements of worldbuilding and player's immersive experiences, which can provide valuable insights for game developers that will foster the further development of video games, and in turn create even better game experiences for players. To achieve this objective, we will attempt to answer

the research question: *"How does dynamic worldbuilding make user experiences in video games more immersive?",* aiming to reveal how dynamic elements contribute to player immersion and engagement, and why they are essential in creating immersive game experiences.

To address this question thoroughly, our study will break down the term "dynamic worldbuilding" into smaller components and analyze how these specific factors contribute to player engagement and immersion in video games. By investigating the patterns and deviations in how these dynamic elements influence players' immersive experiences, we aim to reveal not only how these elements enhance immersion, but also whether and why they are considered relevant by players.

Furthermore, we hope that our findings in this study will offer valuable insights and practical guidance for improving future video games development.

1.2 Limitations

As the term worldbuilding spans over many areas, it is important to clarify the subject and boundaries of the study. The primary limitation for this study is that we have chosen to focus on worldbuilding within digital video games, excluding other forms of interactive media or entertainment platforms. Furthermore, while this study aims to investigate the effects of dynamic worldbuilding on player engagement and immersion, it does not delve into broader aspects of game design, such as purely technical variables, or other narrative elements. As for secondary limitations, we have chosen to focus our analysis on selected factors of worldbuilding, such as environmental behavior, random events, lore exposition and non-playable character (NPC) interactions, thus potentially overlooking other significant factors and limiting our perspective. These delimitations act as a framework for the study's objectives and methodologies, while simultaneously acknowledging the obstacles and limitations within the chosen subject.

2. Related research

This chapter reviews the existing research on dynamic worldbuilding in video games, it will explore dynamic worldbuilding in general, but it also explores various elements within worldbuilding that contribute to player immersion and engagement in video games. By analyzing these components, the chapter aims to provide an understanding of how dynamic worldbuilding enhances the overall gaming experience.

2.1 Immersion

Immersion, or to be immersed in something, can be explained as the process of being in a deep state of total involvement. Although previous research shows that it's not exactly clear what immersion means or what is causing it, the term has a broad definition and can be applied to many things, whether it be films, literature, music, or in our case, video games (Omeragić, 2019). Immersion in video games typically means that the audience becomes deeply invested in a story, world or character. Additionally, since video games require active participation, one could argue that video games not only offer the potential for greater immersive experiences (Omeragić, 2019), but they also highlight the critical role of immersion in terms of game enjoyment (Brown & Cairns, 2004).

Brown and Cairns (2004) describe three levels of immersion: engagement, engrossment and total immersion. Engagement is the lowest level of immersion where the player is investing their time, effort and attention into a game. This initial barrier requires the player to have a preference for the game, meaning that it's unlikely that the player will even attempt to play a game if it does not align with their own individual preferences. Engrossment is the level of immersion where the player is not only investing their time, effort and attention, but also adding that emotional investment into a game. The game starts to directly affect the player's emotions, which makes the player want to keep playing. This level of immersion could be achievable through certain game features that the players could tell had a lot of effort behind them, such as stunning visuals, interesting tasks and captivating narratives. Total Immersion is the final level of immersion where the player is in a state of complete presence and emotional investment that they detach from reality and lose sense of their surroundings. It's suggested that to achieve this final level of immersion the game needs to both connect to the player's empathy, such as feeling an attachment to the games main characters, and its atmosphere (graphics, sounds, narratives) needs to be relevant to the actions and locations of the characters (Brown & Cairns, 2004).

Other research states that an essential factor in creating an immersive experience in specifically video games is so called player agency. Meaning, the player is more likely to become invested in a game if they are given the ability to impact the story or control some of its aspects, such as offering different endings depending on the player's actions throughout the game or giving players the power to modify the game's surroundings to their own liking. In other words, immersive experiences could be fostered by agency and how a game reacts to the player's actions (Omeragić, 2019).

2.2 Worldbuilding

As described by Anne Reid at Massive Entertainment (2020), worldbuilding is the process of constructing a set of rules for a world that is different from our own, or more simply put,

creating an imaginary world. It is a broad term that includes many different aspects, geography, physics, history, biology, sociology, languages and more (Wołek, 2022). The process of worldbuilding usually demands a significant investment of time and effort, regardless of the medium. World-builders in the form of renowned authors and designers dedicate many years to shaping a world's landscape, inhabitants, history and other intricacies. Although not everyone in the audience may notice or fully understand every aspect, they provide the creators with a solid foundation that will add depth to both the world and its narratives (Omeragić, 2019). Good worldbuilding in a video game can not only provide the player with relatable characters and compelling narratives, but it can also fuel curiosity, driving further exploration and progression, while setting goals and mysteries that will immerse players deeper into the game (Reid, 2020).

2.2.1 Environmental behavior

The findings of an observational study by Roberts (2018) reveal the impact of weather simulations on user engagement within virtual environments. Two experiments were conducted to analyze participants' responses to photorealistic weather in virtual environments, testing two games, one with weather simulation and one without. The results showed that weather could evoke physiological responses similar to natural behavior, such as feelings of cold and warmth. This demonstrates how dynamic worldbuilding enhances the immersion of video games by creating a living, breathing environment that responds to player actions and evolves over time, as discussed by Schell (2020). Such dynamic elements, including changing weather systems, day-night cycles, and interactive ecosystems, make the game world feel more real and unpredictable, encouraging players to become more invested in the game and its narrative.

Furthermore, thematic cohesion plays a significant role in players' emotional experiences within video games. It contributes to the emergence of atmosphere, affects players' affective experiences, and influences their perception of game quality. Ribeiro et al. (2020) note that game designers are responsible for ensuring that a game is aesthetically coherent and creates the appropriate mood by using various elements such as lighting, color palette, weather effects, audiovisual effects, music, and ambient audio to enhance thematic fit and atmosphere. This thematic cohesion is crucial for immersing players in the game's world and narrative.

Aesthetic aspects also contribute significantly to the game's overall mood, establishing the atmosphere and eliciting particular emotions from players. As Schell (2020) argues, whether it's a sense of awe in a fantasy world or suspense in a horror scenario, the blend of visuals, music, and sound design generates a distinctive ambiance that enriches the gaming experience. Thus, the seamless integration of dynamic worldbuilding and thematic cohesion within the

aesthetic framework of video games creates an immersive and emotionally engaging experience for players.

2.2.2 Random encounters

According to Fort (2015) advancements in gaming technology have allowed for the refinement of the algorithms that control random encounters. Modern role-playing games (RPGs) employ sophisticated systems that aim to balance the frequency and difficulty of these encounters, ensuring that they serve the narrative and gameplay without overwhelming the player. This algorithmic sophistication aids in maintaining a seamless flow within the game, preventing random encounters from becoming a disruptive element that detracts from the overall experience.

Furthermore, Fort (2015) underscores that the audiovisual execution of random encounters plays a significant role in enhancing immersion. The abrupt transition from exploration to combat is often accompanied by dramatic shifts in both visual elements and musical scores. These transitions are designed to evoke an emotional response from the player, thereby deepening their engagement with the game and enhancing the immersive quality of the experience.

In conclusion, random encounters serve as a fundamental aspect of RPGs, significantly contributing to the immersive experience sought by players. Through a combination of surprise, narrative consistency, algorithmic refinement, and audiovisual design, these encounters provide a rich and dynamic layer to gameplay, keeping players invested and attentive to the world around them. However, it's worth noting that while these observations are widely accepted within the gaming community, there remains a scarcity of comprehensive studies to empirically validate these assertions. Further research in this area could provide valuable insights into the precise mechanisms through which random encounters impact player immersion and engagement (Fort, 2015).

2.2.3 Lore exposition

Lore as a general term could be described as the collective knowledge, culture and traditions related to a particular group or subject. In video games, lore is the background of worldbuilding and can include everything from geography, demography, languages and ideologies as well as other elements. Lore can be incorporated through both large and small details, which not only help the player make sense of the fictional world they are in, but also adds life to an otherwise empty setting (Wołek, 2022).

Studies show that lore is an important factor when creating an immersive experience. Wołek (2022) suggests that lore exposition in video games can be categorized by function or delivery. Meaning, it serves either a general function, influencing the mood and atmosphere of the game to form an idea of the feeling, or a specific one, providing concrete details and facts about the

in-game world such as names, events, dates, places and objects. Lore exposition can be presented via text, visuals or sound. Text-based methods convey information on lore through dialogue, narration and in-game texts such as journals or books that the player can find laying around. Visual-based methods use the appearance of characters, objects and environments to present information to the player. For example, a glass corridor with water and fish behind the windows could suggest an underwater setting. Sound-based lore exposition uses voice acting, soundscapes and music. Such as characters living in tunnels speaking with hoarse voices due to the underground air being polluted.

Combining the different methods of lore exposition adds variety to the game and keeps the player interested. However, for the sake of storytelling it's not always recommended to share every detail about the in-game world. Leaving certain things to the player's imagination encourages them to examine the information provided and form their own conclusions (Wołek, 2022).

2.2.4 NPC interactions

Interactions and relationships with non-playable characters (hereafter referred to as NPCs) are an essential factor in video games. NPCs are computer-controlled characters within a game, meaning characters that are not directly controlled by a player. Their purpose is to populate an otherwise empty world and to enrich the player's immersive experience (Filipović, 2023). Recent studies show that video games that offer authentic interactions with NPCs often foster deeper connections than parasocial interactions (PSI) with characters in film or television. However, unlike their counterparts, video game characters are designed by code to react to the player's actions, which gives them a deeper sense of vitality (Elvery, 2023).

Elvery (2023) suggests that the credibility of a character depends on their portrayal of intelligence and autonomy. However, to further understand these complex behaviors and their patterns within NPCs, one must delve into topics such as artificial intelligence (AI). Previous research shows that AI plays an important role in video game development and particularly NPC behavior. Not only does AI dictate how these characters react and act towards the player, but also how they interact with the environment and other artifacts (Tupe et al., 2016). AI can not only be used to replicate human-like cognition within NPCs, but it can also be used to analyze player behavior and adjust dialogue or reactions accordingly, which makes the characters authentic and responsive to player interactions, allowing for a more personalized and satisfying game experience. Consequently, there's a demand that NPCs have a high level of realism in their appearance, movements, dialogues, and decision-making processes (Filipović, 2023).

3. Methods

Dynamic worldbuilding in video games is a complex process that involves the creation of immersive, responsive environments that evolve based on player interactions. To understand the effectiveness of dynamic worldbuilding techniques and gather data on player experiences, a structured approach to research is essential. Following the guidelines defined by Oates et al. (2022) in "Researching Information Systems and Computing," the research adopted a mixed-methods approach, combining quantitative data from questionnaires with qualitative data from case studies. This methodology aligns with Oates' emphasis on the importance of addressing both the 'how' and 'why' aspects of questionnaires.

When it comes to questionnaires, the sampling method used in this study was convenience sampling due to its practicality and efficiency in gathering data. As Oates et al. (2022) suggest, this method is particularly useful when the researcher needs to collect data promptly or when access to the target population is limited. The use of convenience sampling allows for quick access to participants who are available or easily reachable, increasing the likelihood of obtaining sufficient responses within a short timeframe.

Although convenience sampling may introduce some level of bias due to the non-random selection of participants, its utilization was justified by the focus of this study. The primary objective was to understand the experiences and perspectives of individuals within a specific context. By targeting participants who were readily available or accessible, we could efficiently gain relevant insights without noticeable delays or challenges.

To improve the validity of the findings, two video games have been selected as case studies to perform a detailed analysis of dynamic worldbuilding. The analysis was compared with the questionnaire responses to identify any correlations between the players experiences and the observed game design strategies.

The comparative analysis of the case studies provided a qualitative dimension to the research, allowing for a deeper understanding of the dynamic worldbuilding process. This qualitative analysis complemented the quantitative data obtained from the questionnaires, thereby offering a more rounded perspective on the research question. By integrating questionnaires with case studies, the study aims to balance the need for efficient data collection with the desire for in depth analysis. This methodological approach aligns with the recommendations of Oates et al. (2022), ensuring that the research captures the multifaceted nature of player interactions with game worlds.

The analysis of the empirical material gathered from the survey was done using a thematic approach. This method involved systematically identifying and analyzing repeating patterns (themes) within the qualitative data provided by participants. Thematic analysis was particularly suitable for this study, as it allowed for the exploration of recurring ideas and

experiences related to dynamic worldbuilding in video games. By coding the responses and grouping them into themes, such as "emotional NPC interactions," "impact of dynamic environments," and "preferences for lore exposition," the analysis provided a nuanced understanding of how different elements of worldbuilding contribute to player immersion. This approach enabled the research to capture the depth and complexity of player experiences, ensuring that the findings were grounded in the actual perceptions and narratives shared by the participants.

Ethical considerations were an essential element of this study. To ensure that, this research follows the four main principles outlined by the Swedish Research Council (Vetenskapsrådet, 2017) The information requirement, consent requirement, confidentiality requirement and utilization requirement.

The information requirement requires researchers to provide participants with complete information about the purpose of the study, the participants role in the study, and the conditions of their participation. In this study in the introduction part of our survey, we informed the participants about the purpose of the study, which is to research the nature of the Dynamic Worldbuilding and its influence on player's immersive experiences in video games. By defining dynamic worldbuilding and providing some examples, participants gain enough information about the study's goal and focus.

The consent requirement mandates that researchers obtain explicit consent from participants and that they agree to the use of their data according to the information provided. Due to the survey being online, asking for explicit consent would be unnecessary, as the participants engagement with the survey itself serves as an acknowledgment of their consent. Also, the participants had the ability to cancel the process at any moment if they did not want to partake. Although we could have stated that participants can withdraw at any time without any negative consequences, ensuring they do not feel forced. Furthermore, the confidentiality and anonymity of the participants were assured, there was a clear statement that informs and reassures participants that their privacy will be protected. No personally identifiable information was collected, ensuring that responses could not be traced back to individual participants.

The utilization requirement stipulates that data collected from participants should only be used for the stated research purposes and not for any other external or commercial use. In accordance with this principle, all data collected during the study were stored securely using encrypted storage solutions. Access to the data was restricted to the research team to maintain confidentiality and it will be deleted after a predetermined period and will not be shared or utilized for any other purpose.

3.1 Survey

The survey consisted of 11 questions, 2 qualitative and 9 quantitative, with an additional 2 questions regarding the participants' age group and years of experience. All in all, a total of 13 questions. See appendix 1 in appendices for the full survey. Mainly four question types were used in the survey: single-answer, where participants are provided with multiple response options but can only select one choice; multiple-answer, where participants are provided with multiple response options and can select one or more choices; open-ended answer, there participants have the opportunity to provide a short response in their own words; and rating-scale answer, where the participants are asked to rate a question using a scale, either numeric or text-based (*Google Surveys Help*, n.d.).

The survey was distributed through personal social media platforms such as Facebook and Discord, and to acquaintances within the authors' network.

The purpose of the study's initial qualitative question "*In what ways do you think that dynamic worldbuilding can lead to a more engaging game experience for players? If possible, provide examples from your own experiences in gaming.* " is to explore the relationship between dynamic worldbuilding and player engagement in video games, whereas the second qualitative question "*Have you ever felt "disconnected" from a game world due to flaws in or absence of dynamic elements? If so, please describe that experience.*" seeks to further understand player disengagement in relation to a game world, and what specific aspects are to blame. Examples provided by the participants' own experiences in video games offer valuable qualitative data for the research study.

Several quantitative questions were included to explore and gather insights into the gaming experiences and preferences of participants. Firstly, the survey sought to get a sense of the participants' age by asking the question "*Which age group do you belong to?*". The question was presented in a rating-scale format, with five choices provided ranging in age groups of 12-17, 18-29, 30-39, 40-49 and 50+ years. To also get an idea about the participants' years of experience in terms of playing video games, the second question "*How long have you been playing video games?*" was included. It was another rating-scale format question that provided five choices ranging from "less than one year", "1-3 years", "4-7 years", "8-10 years" and "more than 10 years".

Furthermore, participants were asked "*How does dynamic worldbuilding influence your emotional connection (immersion) to the game experience?*" with the intent to gain an understanding of how elements of dynamic worldbuilding influence players emotional investment in correlation to their immersive experiences within video games. The rating-scale format question provided five choices ranging from "greatly enhances my connection", "somewhat enhances my connection", "no noticeable influence", "somewhat reduces my connection" and "greatly reduces my connection".

Participants' perceptions of environmental behavior and aesthetics were investigated through two questions. The rating-scale question *"On a scale of 1 to 5, how much do you feel that environmental behavior and aesthetics contribute to your overall enjoyment in video games?"* was included to seek insight into the extent to which elements like the game's aesthetic and interactive environmental features influence players' overall game experience. Five choices were provided ranging from 1, which represented "not at all", to 5, which represented "very much". Followed by the question *"Which aspects of the game's environment do you find most captivating or effective in making the game world feel more real?"* which was aimed at getting an idea about what aspects of a game's environment that the participants find most appealing or important to create a sense of realism. This question was presented in a multiple-answer format with four choices as well as an "other" option where the participants could add their own suggestions.

The choices provided were as following:

- Interactive visuals like realistic weather simulations

- Day-to-night cycles, the transition from day to night

- Thematic consistency in the game environment

- Aesthetic design, style and the visual the display of the game world

To seek insight into the extent to which random encounters in video games influence players' overall game experience, the question *"On a scale of 1 to 5, how much do you feel that random encounters contribute to your overall enjoyment in video games?"* was included, also in a rating-scale format. This question provided five choices ranging from 1, which represented "not at all", to 5, which represented "very much". Additionally, the balance between frequency and difficulty of random encounters was examined through the question *"How do you perceive the balance between the frequency and difficulty of random encounters in relation to your game experience?"*. This question was presented as a multiple-answer format question with 5 choices and an additional "other" option where the participants could add their own suggestions.

The choices provided were as following:

- I prefer frequent encounters that are easy

- I prefer frequent encounters that are moderately challenging

- I prefer fewer encounters that are challenging

- I prefer a balanced mix of encounters

- I have no preference

Participants' perceptions of lore exposition were investigated through two questions. The rating-scale question *"On a scale of 1 to 5, how much do you feel that lore exposition contributes to your overall enjoyment in video games?"* was added to seek insight into the extent to which lore exposition as a general term influence players' overall game experience. This question was presented with five choices ranging from 1, which represented "not at all", to 5, which represented "very much". Continuing with a single-answer format question, *"Which method of presenting lore do you find most engaging and effective in enhancing your understanding of the game world?"* which aim was to understand the participants' preference for lore exposition in relation to the game world. This question was presented with 5 choices and an additional "other" option where the participants could add their own answers.

The choices provided were as following:

- Text-based methods (dialogue, narration, in-game texts)

- Visual-based methods (appearance of characters, objects, environments)

- Sound-based methods (voice acting, soundscapes, music)

- Combination of all the above

- Neither

To investigate participants' perceptions of NPC behavior two questions were added. Firstly, the question *"On a scale of 1 to 5, how much do you feel that the portrayal of intelligence and autonomy in non-playable characters (NPCs) contributes to your overall enjoyment in video games?"* was added to understand how players perceive and value non-playable character (NPC) interactions and behavior in relation to their overall game experience. This question was presented in a rating-scale format, with five choices provided ranging from 1, which represented "not at all", to 5, which represented "very much". Followed by the question *"Which aspects of non-playable character (NPC) behavior do you find most appealing or effective in creating an authentic character and enjoyable game experience?"* which aimed at gaining understanding about what behavioral aspects of a game's non-playable character (NPC) that the participants find most appealing or important to create a sense of autonomy. The question was a multiple-answer format with 8 choices and an additional "other" option where the participants could add their own suggestions.

The choices provided were as following:

- Adaptive decision-making

- Convincing backstory and motives

- Emotional and psychological depth

- Interactions with the game world

- Lifelike movements and expressions

- Reactions to player actions and choices

- Unique quirks and personality traits

- Varied dialogue responses

3.2 Game analysis

The video game industry is growing rapidly, and understanding how to analyze different aspects of it is crucial. The methodologies proposed by Espen Aarseth (2003) offer a profound understanding of the medium's unique qualities. Among these methodologies, the act of playing the game itself stands out as a critical approach. This immersive engagement allows researchers to experience the game's mechanics, narrative, and interactive elements firsthand.

Aarseth (2003) describes three approaches for game analysis. The first method involves studying the game, such as its design, rules and mechanics, to the extent that the information is available without interacting with the game or its players. The second method involves observing others play the game or studying other players' reviews of the game, which mainly relies on secondary experiences of users who may or may not have representative knowledge or expertise in games. The third method involves playing the game ourselves, something that Aarseth (2003) emphasizes is the best approach of a game analysis. It is even better if this method is combined with, or complemented by, both studying the game and observing others playing the game, as there is always a major risk of misunderstandings without any firsthand experience. In comparison to other media studies, such as film or literature, games require interactivity to generate actions and foster progress, and can't be understood by merely observation. Likewise, observing others play a game is only a partial representation of what the player experiences. A non-players' perspective can lack valuable insights that, in comparison to one that has played and mastered a game, could prove quite effective for both studies and observations. However, even though playing the game oneself is essential, Aarseth (2003) states that since games are "performance-oriented" one should combine as many sources as possible when gathering information about the game, suggesting that relying solely on one's own performance may not be the most reliable approach.

Alas, the approach taken to analyze a game is known as participant observation. According to Aarseth (2003) the approach to game analysis by playing the game emphasizes the

importance of immersive engagement. By stepping into a player's shoes, a researcher can experience the game's environment, mechanics, and story firsthand. This direct interaction is critical to understanding the nuances of the player experience and the game's interactive elements. Through this method, researchers gain insights into the game's design and its impact on the players. They encounter the challenges and pleasures integral to the gaming experience, which can be overlooked by mere observation. Playing the game also allows researchers to understand the sense of agency that players feel as they navigate through the game world, making choices that affect the outcome of the game and its story.

Furthermore, Aarseth (2003) highlights a typology of player types, which could serve as a general model of human behavior in virtual environments. These player types are *socializers,* players who seek enjoyment by playing in the company of other players; *killers,* players who enjoy targeting and harassing other players; *achievers,* players who enjoy winning and triumphing; and *explorers,* players who enjoy discovering the game's secrets and hidden mechanics, including detecting and exploiting programming errors (such as hacks). Additionally, there are different approaches to analyzing gameplay, depending on one's player type and experience level, such as newbie, casual or hardcore. Some of the most distinctive modes are *superficial play*, which involves briefly exploring the game without learning its mechanics; *light play*, which allows for meaningful progress but stops before completion; *partial completion*, which occurs when a sub-goal is achieved; *total completion*, which means playing a game until reaching its defined ending; *repeated play* and *expert play*, which typically follow total completion; and *innovative play*, which involves creating new strategies not previously recognized by others, to achieve certain goals.

In conclusion, practical experience is invaluable for contextual analysis. It provides a deeper appreciation of the game's elements within its natural flow. It also builds empathy for the player's emotional journey, which is important when analyzing the game's psychological impact. Engaging in the game in this way also encourages reflexivity among researchers. It makes them reflect on their own experiences, prejudices and reactions, which can lead to a more nuanced and comprehensive analysis. Essentially, playing the game as a method recognizes embodied experience as an important component of understanding the complex medium of video games (Aarseth, 2003).

4. Results and analysis

The following section presents the results from the survey, segmented into qualitative and quantitative data, alongside two individual game analyses conducted by the authors of this study.

4.1 Survey results

4.1.1 Qualitative data

In regards to the survey's first qualitative question *"In what ways do you think that dynamic worldbuilding can lead to a more engaging game experience for players?"* where the participants were prompted to provide examples from their own game experiences, one of the major themes that we identified in the survey responses was feeling a sense of realism and that the game world is alive. Or as one of the responses nicely put it, "feeling as though you're a part of a world that exists without you - where NPCs go about their business, where seasons come and go and where events take place even without your direct involvement". *The Elder Scrolls VI: Skyrim*, *The Witcher 3*, *Far Cry 2* and *Ultima* are mentioned as examples of game worlds that feel alive, regardless of the player's interactions. One response stated, concerning the sense of realism in Skyrim, that "random events and weather changes show that there is a life cycle independent of the player's actions" and that the "random NPCs' reactions to the player's actions give the impression that they are intelligent and that there is depth to behavioral patterns". Another response mentioned the rush of being randomly attacked by a tiger shark after hopping on a jet ski in *Far Cry 2*, outside of any questlines. As well as the psychological depth and the many different outcomes of *The Witcher 3*, which the participant stated is "probably the most engaging of any game I have played really". One response stated that "a world that feels more alive is closer to real life and thus more engaging".

Survey participants consistently praised the inclusion of random and unique encounters, stating that these elements make game worlds feel more alive and engaging. Games like *Red Dead Redemption 2* (RDR2) and *Skyrim* were frequently cited as exemplary for their dynamic encounters. These encounters not only awaken player interest but also enhance replay ability, as varied and unpredictable elements encourage multiple playthroughs to experience different outcomes. Players expressed a strong preference for events that occur randomly, or as a result of specific player actions, making each playthrough potentially unique and intriguing. Related to the random encounters, there were some time-specific events highlighted as a crucial feature that adds depth to game worlds. Respondents appreciated how events that only occur during certain times of the day or night motivate them to explore at different times, leading to new discoveries and experiences. The dynamic change between day and night in games like *Need for Speed Heat* was mentioned as an effective way to offer variety and keep the gameplay fresh and exciting. Players also expressed that random encounters should be well balanced, otherwise it might break the immersion.

Another common theme that we identified in the survey responses was cause and effect. Participants stated that actions that have consequences makes the game feel more "vivid" and "allow for more meaningful and impactful decisions and gameplay". One response highlights

the importance of feeling that your actions and choices "actually make a difference". Games such as *Read Dead Redemption 2, Fallout 2* and *The Legend of Zelda: Breath of the Wild* were mentioned as examples of good or interesting cause and effect-features. One participant referred to *Fallout 2,* where the player can get "quest-locked" when doing certain quests, which requires the player to consider in which order they do certain quests. Another distinctive comment regarding cause and effect in *The Legend of Zelda: Breath of the Wild* was how the weather can affect a player's combat strategy. The participant explained that during thunderstorms and depending on what items you have equipped, lightning can strike and damage your character if you are equipped with metal weapons", utilizing a creative variation of the cause and effect-feature that adds to a more engaging experience for the players.

Regarding environmental behavior and interactions, the survey results revealed a strong preference for realistic environmental behavior, such as getting muddy when it rains or needing to dress appropriately for the weather. *Red Dead Redemption 2* was again highlighted for its utilization of those elements and detailed environmental interactions, which greatly enhance immersion. Players also valued distinct regional characteristics, for example *The Witcher 3*, where each area has its unique weather patterns and environmental features. This regional distinctiveness, combined with weather and terrain effects that influence gameplay mechanics, was seen as important for creating an immersive and realistic game world.

Several participants stated that non-playable character (NPC) behavior and interactions was a main factor in creating an engaging game experience for them as players, such as how NPCs react and respond to the players actions, versus how they behave regardless of player interaction. Many of the participants mentioned *Read Dead Redemption 2* as an example of good and well nuanced NPC behavior in games. *The Witcher 3* and *Star Wars Jedi: Survivor* were also mentioned as good examples. One of the participants stated that "well-scripted NPCs gives the game much more life" and compared this to certain older generation games that allow the player to damage friendly NPCs without causing any significant reaction from them, which according to the participant "enforces the perception that they're just a scripted entity". Another participant stated that "games where it doesn't matter how you treat NPCs lose a big aspect that helps you feel the game feels real". This aspect is reinforced by another comment that stated that seeing no reaction or change in behavior while interacting with an NPC, whether your interaction is friendly or violent (such as punching them in the jaw) is "massively unrealistic and immersion-ruining".

Lore exposition was another aspect of dynamic worldbuilding that was a common theme in the survey responses. Most participants that mentioned lore exposition in their responses agreed that it was an important factor in creating an engaging game experience for them as players, as long as the methods used felt natural and not forced. Some responses stated that using mainly text-based methods, such as books or journals, more often had a negative impact

on their game experience, rather than using visual- or audio-based methods. However, too much or badly written dialogue as well as bad voice acting was mentioned as a factor in breaking immersion. One of the responses stated that they preferred if the lore was "baked into" the voice acting, dialogue, art direction or gameplay. Another response wanted the game "to vividly show stories through remnants", rather than using audio-logs and journal-entries.

A handful of survey responses pointed out purely visual, audio and narrative aspects. One participant stated regarding the importance of voice acting, that "a game can really fall flat if there aren't good voice actors" and that "they are the ones who make you feel for the characters and understand their feelings and personalities". Besides purely visuals or sounds, there were some responses that mentioned randomization and non-repetitiveness in games as an important factor for player engagement. One response stated that "different kinds of environments are good for immersion" and another that "randomization creates replayability, and less repetitive gameplay/environment is always better". Another comment that stood out was the balance of large open-world maps in relation to the range of activities provided in the game. The participant mentions the game *Fuel* as an example which "has a huge open world (14.000 km²), but this makes no sense - because there are few activities in the game".

Regarding the second qualitative question "*Have you ever felt "disconnected" from a game world due to flaws in or absence of dynamic elements?*", 60.4% of the participants confirmed that they indeed have experienced disengagement from a game world due to this, and most of them continued to describe an experience of their own. The remaining 25% of the participants answered "no", while 12.5% answered "probably", "I don't know" or didn't provide an answer at all.

One of the more prominent themes mentioned by participants was the inconsistency in non-player character (NPC) behavior, whereas many participants criticized blank stares, lack of reaction or emotional response to the environment or the players actions. Another common theme among the responses was the static nature of certain game worlds where participants expressed disappointment with environments that remained unchanged over time, leading to repetitive experiences and diminished realism. Other responses raised concerns about empty or unrealistic environments, where interactions with NPCs or other elements in the game felt insufficient or lacking depth.

Furthermore, participants also described specific gameplay mechanics and design choices that detracted the player from their immersive experience. Examples included slow-motion mechanics, stunted movements, and forced tutorial segments that felt detached from the rest of the game. Technical issues and unfinished components were also a theme that was mentioned. Participants described instances of glitchy mechanics, poor optimization, and overall instabilities as factors that contributed to a sense of detachment and frustration.

4.1.2 Quantitative data

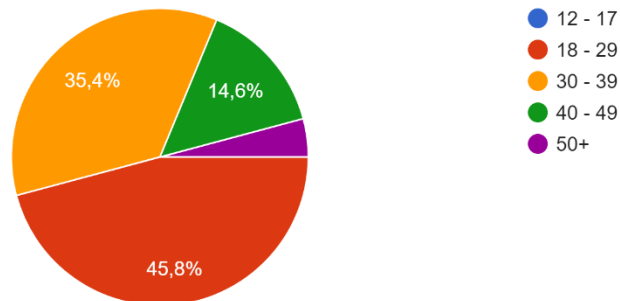1. Which age group do you belong to?
48 svar

Figure 1: Results of question 1 regarding age groups

In response to question 1 (see figure 1) regarding which age group the participant belongs to, most participants are within the 18-29 age group, followed by the 30-39 age group. The 12 - 17 and 50+ age groups have the least representation.

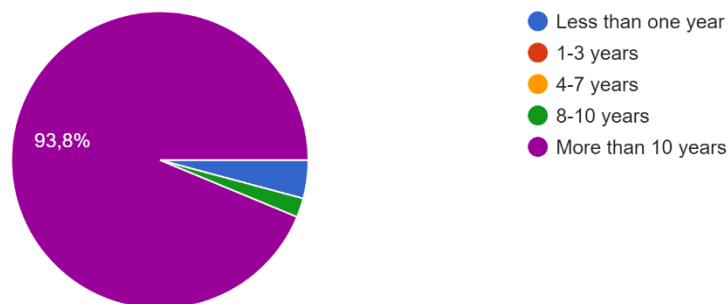2. How long have you been playing video games?
48 svar

Figure 2: The distribution of player experience.

Regarding how long the participants have been playing video games, an overwhelming 93.8% of the participants in the study replied that they have been playing video games for more than 10 years (see figure 2), indicating a highly experienced gaming audience.

3. How does dynamic worldbuilding influence your emotional connection (immersion) to the game experience?
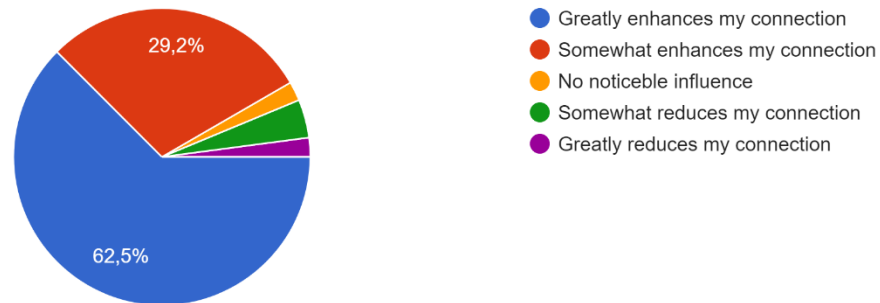
48 svar

- Greatly enhances my connection
- Somewhat enhances my connection
- No noticeble influence
- Somewhat reduces my connection
- Greatly reduces my connection

Figure 3: Influence of dynamic worldbuilding on player immersion.

As shown in figure 3, concerning dynamic worldbuilding's influence on players emotional connection and game experience, 62.5% of respondents feel that dynamic worldbuilding greatly enhances their emotional connection to the game, suggesting a strong impact on player immersion. At the same time 29.2% responded that dynamic worldbuilding somewhat enhances their emotional connection. About 8% of the respondents reported that dynamic worldbuilding reduces their emotional connection to the game.

5. On a scale of 1 to 5, how much do you feel that environmental behavior* and aesthetics** contribute to your overall enjoyment in video games?
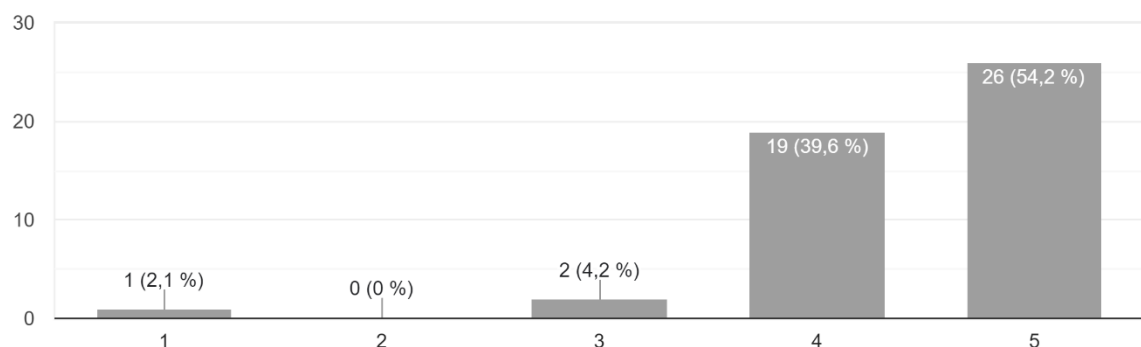
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Figure 4: Importance of aesthetics on player enjoyment.

Concerning the question on environmental behavior and aesthetics in relation to players overall enjoyment in games (see figure 4), most respondents value these aspects highly, with 54.2% giving a rating of 5, which indicates a strong contribution to enjoyment. A noticeable 39.6% rated it a 4, showing that players find these factors important. Only a small fraction

rated it lower with 4.2% giving a 3 and 2.1% giving the lowest rating of 1. This indicates that for the majority of the players environmental elements and visual appeal are important components that enhance their in-game experience.

6. Which aspects of the game's environment do you find most captivating or effective in making the game world feel more real?
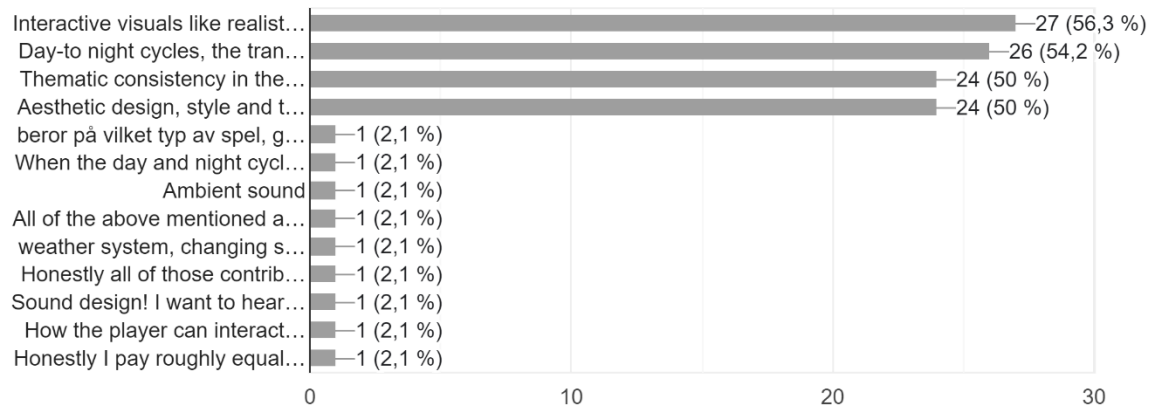
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Figure 5: Environmental aspects that make the game world feel more real according to players.

In relation to the question on which aspects of the game's environment that players find most captivating or effective in making the game world feel more real, the responses highlight several elements (see figure 5). It indicates that values such as realistic weather simulations and day to night cycles were highly favored, one receiving mention 27 (56.3%) and the other 26 mentions (54.2%). Thematic consistency and aesthetic design also were highly valued with each receiving 24 (50%) mentions. Indicating that these elements contribute to a sense of immersion and realism, enhancing the player's experience by making the game world appear more alive.

7. On a scale of 1 to 5, how much do you feel that random encounters* contribute to your overall enjoyment in video games?
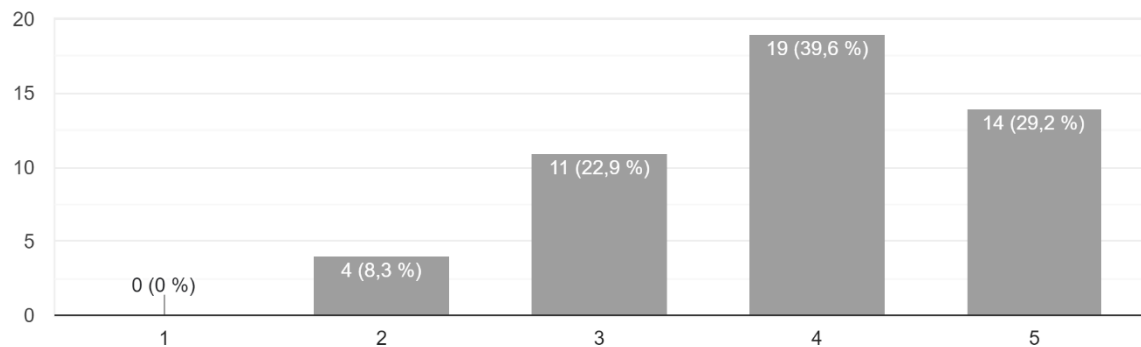48 svar

Figure 6: Importance of random encounters on player enjoyment.

Regarding the question on how much players feel that random encounters contribute to their overall enjoyment in video games (see figure 6), the results showed that a majority of 19 (39.6%) participants rated it a 4, and another 14 participants gave it a 5, the highest enjoyment rating possible. 8.3 percent gave it a 2 and 22.9 gave it a 3. The result indicates that most players find random encounters to be a major factor in their gaming experience.

8. How do you perceive the balance between the frequency and difficulty of random encounters* in relation to your game experience?
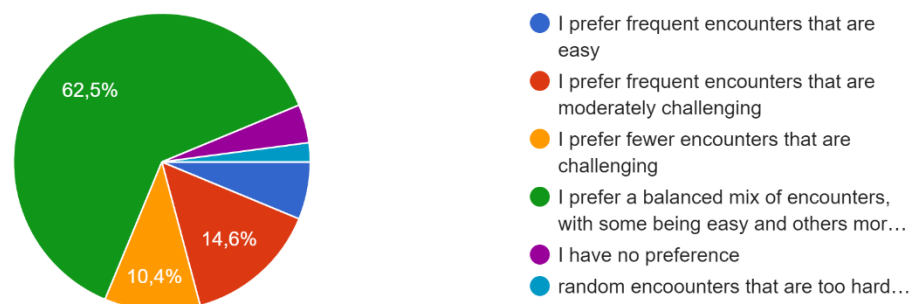48 svar

Figure 7: Results of question 8

As for how players perceive the balance between frequency and difficulty of random encounters in relation to their game experience (see figure 7), the majority (62.5%) of the participants answered that they prefer a balanced mix of random encounters in video games. In comparison to the minority (4,2% of the participants) which answered that they had no preference. 14.6% of the participants prefer frequent encounters that are moderately challenging, while 10.4%

prefer fewer encounters that are challenging and leaving 6.3% of the participants which prefer frequent encounters that are easy. One participant (2.1%) chose to add their own answer under the "other" option, where they stated that random encounters that are too challenging can cause frustration and disturb the gameplay flow.

9. On a scale of 1 to 5, how much do you feel that lore exposition* contribute your overall enjoyment in video games?
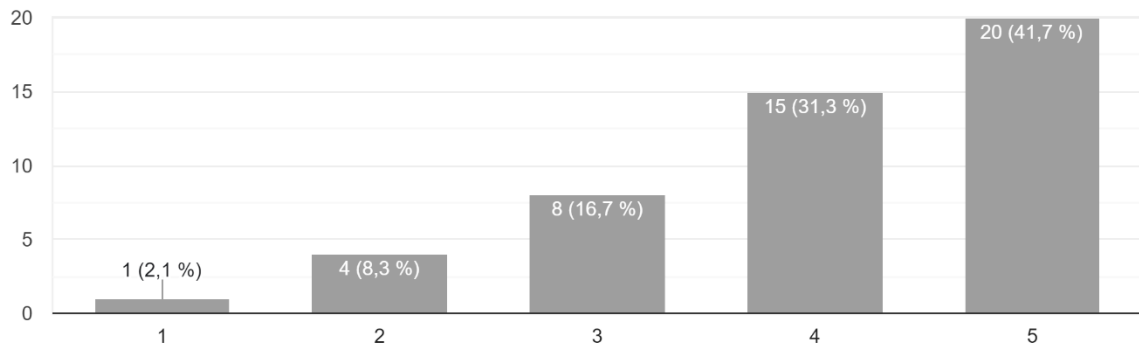48 svar

Figure 8: Importance of lore exposition on player enjoyment

For the question of how much players feel that lore exposition contributes to their overall enjoyment in video games, 41.7% of the participants answered with the highest rating (5), indicating that lore exposition contributes much to their overall enjoyment in video games. Followed by 31.3% which rated it a 4, 16.7% rating it a 3 and 8.3% rating it a 2. Only one of the 48 participants (2,1%) answered with the lowest rating (1).

10. On a scale of 1 to 5, how much do you feel that the portrayal of intelligence and autonomy in non-playable characters (NPCs) contribute your overall enjoyment in video games?
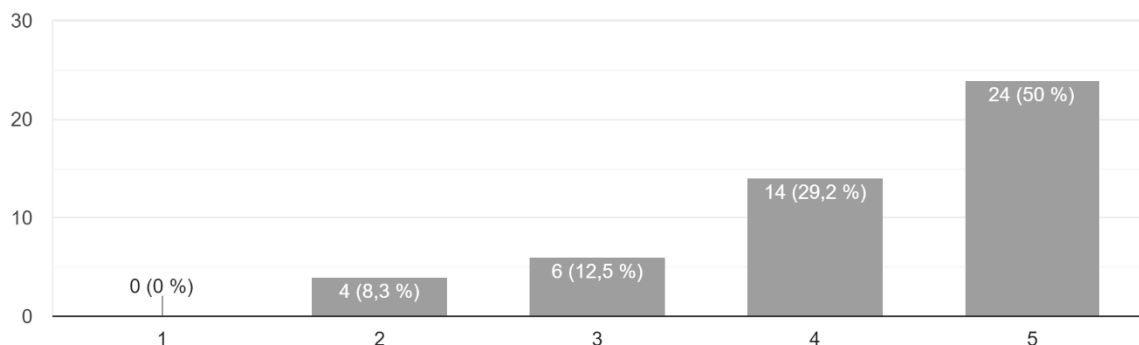48 svar

Figure 9: Importance of intelligence and autonomy in NPCs on player enjoyment.

Concerning the portrayal of intelligence and autonomy in non-playable characters (NPCs) and its contribution to players overall enjoyment in video games (see figure 9), half of the participants answered with the highest rating (5), indicating that this contributes "very much" to their overall enjoyment of video games. 29.2% of the participants rated it a 4, followed by 12.5% which rated it a 3, and 8.3% at 2. None of the participants answered with the lowest rating (1).

11. Which method of presenting lore do you find most engaging and effective in enhancing your understanding of the game world?
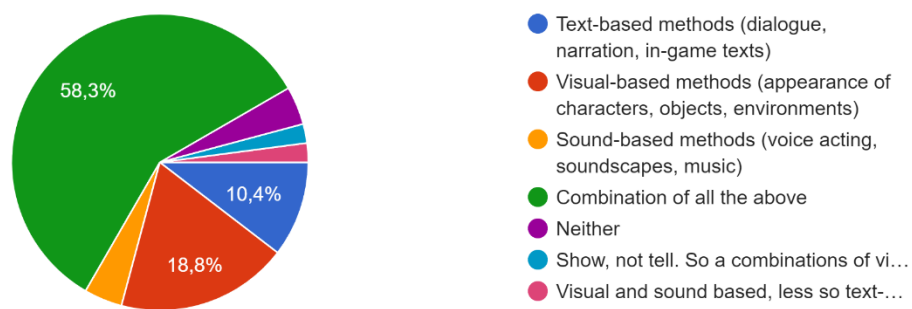
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Figure 10: Results of question 11 regarding lore exposition methods

As visible in figure 10, regarding which method of presenting lore that players find most engaging and effective in enhancing their understanding of the game world, 58.3% of participants answered that a combination of all the lore exposition methods were preferred in understanding the game world, which was to be expected. The second highest answer rate was 18.8% which stated that participants preferred visual-based methods, while text-based methods had an answer rate of 10.4%, leaving sound-based methods as well as none of the methods mentioned at 4.2%. The remaining participants (4.2%) chose to add their own answer under the "other" option, where they stated a preference for visuals and sound, excluding text-based methods.
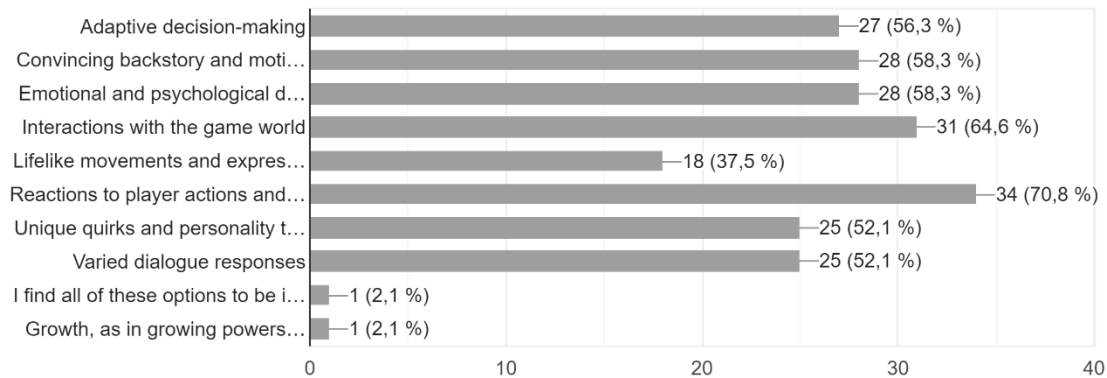
Figure 11: Results of question 12 regarding non-playable character (NPC) behavior

As for which aspect of non-playable character (NPC) behavior that the players find most appealing or effective in creating an authentic character and enjoyable game experience (see figure 11), most of the participants (70.8%) thought that "reactions to player actions and choices" was an important aspect of NPC behavior. Followed by "interactions with the game world" with an answer rate of 64.6%. In comparison, "lifelike movements and expressions" was rated lowest at 37.5%. Remaining choices "adaptive decision-making", "convincing backstory and motives", "emotional and psychological depth", "unique quirks and personality traits" and "varied dialogue responses" were all at an answer rate between 52-58%.

4.2 Game analysis

4.2.1 Case Study 1: Red Dead Redemption 2

Red Dead Redemption 2 (RDR2) has been selected for analysis due to the fact that it stands as an idol of open-world design, where its dynamic worldbuilding is pivotal in creating an immersive and responsive environment. This analysis will explore various aspects of RDR2's world that contribute to its realism and how it affects player immersion.

The majority of reviews from players regarding Red Dead Redemption 2 consistently praise it as a beacon in open-world gaming. According to (*Metacritic*, 2024) the game has over 86% positive reviews. According to user feedback available on (*Steam*, 2024) an impressive 91% of the total 524,181 reviews rate the game very positive. Critics are fascinated by its vast and detailed open world, complex narrative and engaging gameplay. However, some critics do exist, specifically regarding the way that the game is handling the missions. Some players and critics feel that the main missions in RDR2 are too linear, which limits the player's freedom. But most of the negative reviews are aimed towards Rockstar game launcher which is a

software application developed by Rockstar Games. In order to play the digital version of Red Dead Redemption 2 players need to use Rockstar Games Launcher.

Despite these criticisms of the game's worldbuilding, side missions and random encounters are often highlighted as its strongest aspects, providing an immersive gaming experience they can be found in few other titles. The visuals and performance of the game are also frequently praised, with the game being noted for its stunning graphics and the atmospheric beauty of its environments (Robinson, 2019).

Red dead redemptions world feels alive and dynamic, wildlife roams the wilderness, reacting to players actions and environmental conditions. Animals hunt, graze, and interact with each other realistically, adding depth to the ecosystem. This dynamic wildlife system creates a sense of immersion and realism, making players feel like they are truly part of the environment. The game features a dynamic weather system that affects gameplay and NPC behavior. For example, player's movement decreases when it rains and the player gets wet, also if you are riding a horse during the rain the horse will get dirty easier, which decreases its speed. Rainstorms can make roads muddy and affect visibility, while snowfall alters movement and hunting conditions.

Day to-night cycles progress naturally, influencing the activities of NPCs and the availability of certain events or missions. Other than day-to-night cycles the passage of time is evident in the construction of buildings and railways being built over time. These dynamic weather and time systems contribute to the game's immersive worldbuilding by making the environment feel dynamic and ever changing.

Another aspect that feels dynamic is that NPCs have their own routine jobs and relationships with each other. They go about their daily lives, engaging in activities like farming, fishing, or socializing. Players can interact with NPCs in various ways, such as engaging in conversations, helping them with tasks, or witnessing their interactions with each other. If the player decides to interact with an NPC it is possible, the player has the option to greet or antagonize the NPC, the response will not be friendly if the player decides to antagonize. The interaction will affect future conversations, and the direction of the story. This dynamic NPC behavior adds depth to the game world, making it feel more alive and realistic.

The game is filled with random encounters and events that occur dynamically as players explore the world. These encounters range from meetings with strangers who need assistance to stumbling upon illegal activities, when seen such activities the player has the option to interfere or not. These choices have consequences that ripple throughout the game world, affecting NPC reactions, mission outcomes, and the overall state of the environment. Each encounter feels unique and contributes to the sense of immersion and unpredictability in the game world.

4.2.2 Case Study 2: Sons of the Forest

Endnight Games' *Sons of the Forest* (2023) has been chosen for analysis as it offers a fascinating perspective on dynamic worldbuilding. The game incorporates many of the aspects that have been selected for research within the frameworks of this study. For the playing analysis, the analyst will aim to achieve "total completion" which represents playing the game until reaching its defined ending. Furthermore, the analysis is based on the dimensions addressed in Aarseth's (2003) tripartite model which was described in the method section of this study and includes looking at gameplay, game-structure and game-world. To complement the playing section, this analysis also incorporates a brief non-playing section which presents previous knowledge and critical reviews of the game.

Regarding the analyst's previous knowledge and experience, engagement with similar games of the genre, including the prequel *The Forest* (2018), occurred mainly or exclusively with accompanying friends. Any prior experience with *Sons of the Forest* itself was gained during its "Early Access" release in February 2023. Albeit a notable reliance on accompanying friends for tasks such as navigating the island, collecting resources, and progressing the story was evident during this playthrough. Following this, the game has undergone a full release with new updates and content.

In reference to critical reviews of the game, *Sons of the Forest* has predominantly positive reviews from both users and critics according to MetaCritic (2024). A selection of the user reviews highlights the game's approach of "showing, not telling" in relation to lore and progressing through the story, but the main praise is directed towards the Artificial Intelligence (AI) that seems to be the foundation of enemy behavior in the game. One of the user reviews comments that it's "probably the best enemy AI" they have dealt with in a game (*Metacritic*, 2024b). Leana Hafer, author at IGN Nordic (2024) reinforces this statement by adding that "I've never been terrorized, stalked, or fascinated by enemy AI quite like I was in The Forest" and points out that the AI has gotten a significant update since its prequel, with improved stealth, more advanced social dynamics, and more varied group behavior (IGN Nordic, 2024).

In comparison, certain reviews criticize and point out frustration regarding the frequency of enemy attacks, as well as the game's expansive map coupled with limited accessibility, which in certain cases becomes an annoying disturbance. Mixed reviews also highlight concerns about certain limitations in crafting and the building method being too advanced (MetaCritic, 2024). In addition, 86% of the 170,988 user reviews on (*Steam*, 2024) are positive, giving it a "very positive" score.

Sent to find a missing billionaire, the player finds oneself stranded on a remote island inhabited by cannibals and horribly disfigured mutants, where they have to craft, build, and struggle to survive. This is the plot of Endnight Games' *Sons of the Forest*, a horror survival game, and sequel to *The Forest*. In comparison to many other games in the genre, *Sons of the*

Forest does not offer a quest log. The player's primary objectives are located through GPS tags dispersed throughout the map and visible on the character's GPS interface. Carefully exploring the caves and other markers provided on the GPS will allow the player to discover important artifacts that will unlock new areas and further progress in the story.

The player must keep track of needs such as hunger and thirst as the days pass by. Fortunately, the game offers not only a highly realistic environment, but a variation of wildlife and vegetation which can support the continued survival. The crafting feature allows the player to harvest different resources and materials to make weapons, medicine or food. However, the player must take advantage of the seasons, as resources become scarce during winter when the landscape is covered in snow and ice. Season, weather and day-to-night cycles also have an impact on the player, as temperature and weather changes require the player to stay warm and dry with suitable clothing or a nearby fire.

As for lore exposition in the game, there are several mysterious places to be found on the island which explains events prior to the players' arrival. There are vague notes, strange drawings, video tapes and inexplicable, nearly extraterrestrial sites spread out in various places on the island, and since the player can discover these locations at almost any point in the game, it's up to the player to put the pieces together. There is no in-depth information provided that will explain what's going on until you have progressed far enough in the story, which only adds to the mystery and immersive experience of figuring it out yourself.

While exploring, the player may notice red smoke or a helicopter taking off in the distance, indicating that the player is close to a so-called "point of interest". Regardless of whether the player is exploring the forest or immersed in building a base for themselves, one will eventually encounter the island's inhabitants and main predators. The cannibals on the island often run around in groups along certain tracks and are more than curious about any new visitors. Some individuals are found crouching in bushes or hiding up in trees, observing the player from a distance. Others will raid the players camp, which the player most likely will have to defend against.

The complex behavior demonstrated by the cannibals varies, as there are different variants and tribes that have their own unique characteristics and behavior, but generally they are less aggressive when alone, and more aggressive when in a group. Lone cannibals will often just follow and watch the player from a distance or can be caught stealing food and resources from the player's camp, while cannibals in groups are more easily provoked and will initiate attacks. During combat, if the player injures or kills one of the cannibals, others can be seen helping the wounded or mourning their dead. Cannibals are, however, not the only enemy on the island, the game also features mutants, which are far more dangerous monsters, but do not at all possess the same intelligence or self-autonomy as the island's original inhabitants.

In conclusion, *Sons of the Forest* provides dynamic elements that highly contribute to a sense of realism. Players must manage basic needs while navigating a highly realistic landscape environment filled with wildlife and vegetation that adapts to seasonal changes. Lore is subtly incorporated through vague remnants or mysterious locations. Random encounters with the island's hostile inhabitants provide challenging interactions, and the non-playable character (NPC) behavior illustrates nuanced characteristics and interactions that not only feels realistic, but also appeals to the player's morals.

5. Discussion

We were able to identify several common themes in the questionnaire results. Among these were a sense of realism, random encounters, cause and effect, environmental behavior, non-playable character (NPC) interactions and lore exposition. Other themes such as purely visuals, sounds or narratives were also identified, but not mentioned to the same extent and therefore did not add much depth to our analysis.

A sense of realism emerged as one of the most predominant themes identified in the questionnaire results, although its interpretation proved challenging due to its potential associations with various other themes. Players emphasized an ambition for game worlds to feel alive, with independent NPC behavior, environmental changes and random events unfolding, regardless of the player's direct or indirect actions. In the case studies that were conducted in this report, both games *Red Dead Redemption 2* and *Sons of the Forest* are known among players for their highly realistic and dynamic game worlds. Autonomous NPCs, meandering wildlife, interactive vegetation, day-to-night cycles, weather systems, and environmental conditions are a selection of common elements that were identified as contributors in making a game world feel alive and thus creating a sense of realism. Conversely, the questionnaire results also highlighted certain criticism towards static or "unrealistic" game worlds. Unrealistic as in empty or unchanging environments, as well as other elements that lack depth, which demonstrates how immersion could be compromised by the absence of meaningful interactions within the game world. This aligns with previous research by Schell (2020) which indicates that dynamic elements are what gives the game world a sense of realism and unpredictability. Moreover, games that the players can tell have had a lot of effort behind them will more easily fuel the players' immersive experiences (Brown & Cairns, 2004).

Participants showed appreciation towards random encounters for their ability to add unpredictability and excitement to the gameplay, making the game world feel more dynamic. For example, one of the respondents mentioned unexpected wildlife encounters in *Far Cry 2*. In the case study on *Red Dead Redemption 2*, random encounters such as ambushes or finding a stranded NPC add to the game's dynamic environment, keeping players alert and engaged.

As seen in the case study on *Sons of the Forest*, this game also incorporates random encounters with hostile creatures or environmental hazards, which require players to constantly adapt their strategies. The result from this study is aligned with previous research by Fort (2015) that suggests that random encounters in role-playing games (RPGs) contribute significantly to immersion by providing surprise and narrative consistency, with modern RPGs using sophisticated algorithms to balance the frequency and impact of these encounters, ensuring they enhance rather than disrupt the gameplay.

Survey results show that participants value games where their actions have significant consequences, making the gameplay more engaging. Examples that they provided include *Fallout 2* and *Breath of the Wild*, where player decisions impact the game world and story outcomes, allowing for meaningful and impactful decisions. In *Red Dead Redemption 2*, the case study reveals how player interactions with NPCs can influence future interactions and the story's direction. NPCs have their own routines and relationships, and player actions can lead to different outcomes in these dynamics. The case study on *Sons of the Forest* also showcases cause and effect through its survival mechanics, where player choices impact resource availability and NPC alliances. Omeragić (2019) highlights the importance of player agency and meaningful consequences in creating an immersive experience, emphasizing that the ability to impact the story and game world significantly enhances player engagement.

Participants emphasized games where dynamic environmental behaviors, such as weather changes and NPC interactions, significantly contribute to immersion. Specific examples include the life cycle independent of the player's actions in *Skyrim* and the random NPC reactions, enhancing the sense of a living world. The case study of *Red Dead Redemption 2* highlights the dynamic wildlife system where animals hunt, graze, and interact realistically with the environment and the player. This, along with dynamic weather systems affecting gameplay such as rainstorms making roads muddy and influencing NPC behaviors adds to the immersive experience. Similarly, in *Sons of the Forest*, environmental hazards and changing weather patterns impact player strategies and survival, emphasizing the need for adaptation to the environment. Roberts (2018) and Schell (2020) support the notion that dynamic environmental elements like weather systems and interactive ecosystems enhance player immersion by creating a more lifelike and unpredictable game world.

The data identified in the questionnaire results revealed that most players find NPC behavior and interactions to be an important part of their immersive experience in video games. Participants emphasized the significance of NPCs' reactions and responses, both in relation to and unrelated to player action. This resonates with the case study on Red Dead Redemption 2, where NPC's have their own specific routines outside of player interaction but are also directly affected if the player should interact with them in any way. Similarly, in the case study made on Sons of the Forest, the nuanced behavior exhibited by the NPCs

incorporates a deeper level of intelligence and autonomy. Furthermore, inconsistency in NPC behavior (such as lack of reactions or emotional response) was also identified as a predominant factor as to why players would feel a sense of detachment in a game world. This reflects previous research by Elvery (2023) which shows that a plausible depiction of intelligence and autonomy in NPCs is what creates authentic interactions and deeper immersive connections.

Another common theme identified in the questionnaire results was lore exposition. Results show that lore exposition is a highly contributing factor to players' overall enjoyment in video games. As to preferred methods for presenting lore, visual-based is favored over sound- or text-based methods, but most players prefer a combination of all. This is consistent with previous research on lore exposition by Wołek (2022) which emphasizes that combining different exposition methods is what adds variety and keeps players engaged. Furthermore, lore exposition is shown to be an important element of dynamic worldbuilding that enhances the gaming experience, when executed naturally. Participants emphasize a preference for lore that is incorporated into the game's voice acting, dialogue, art direction or gameplay. Conversely, lore exposition that relies solely or heavily on text-based methods was identified as a factor that could break immersion. In the case study on *Sons of the Forest*, the game is shown to exhibit lore through predominantly visual- and text-based methods. However, the information provided is very subtle, which leaves room for the players to figure it out themselves. This approach to lore exposition aligns with previous research, which explains that lore exposition can be used not only to provide concrete details and facts about the in-game world, but also to influence the mood and atmosphere of a game (Wołek, 2022).

The results from the questionnaire identified various aspects that influence or disrupt player engagement and immersion in video games. Additional responses highlighted definite elements such as pure graphics, audio, mechanics, and narratives that should be recognized as important factors in this study but have not been analyzed to the same extent due to the limited amount of data and the study's limitations.

5.1 Future research

As for future research, there is always room for improvement in terms of game development. Looking back, a perspective that would have been interesting to explore and could have added more depth to the research would have been to interview game developers to see what valuable insights they can provide. Furthermore, it would have been rewarding to be able to conduct user tests, to gather practical data on the nature of dynamic elements in video games and the impact they have on the user.

Moving forward, future studies in the subject could incorporate virtual reality (VR) to explore and interact with the dynamic aspects in games. There is also a great potential in

further exploration of artificial intelligence (AI) within video games, not only in terms of non-playable character (NPC) behavior, but as a complement to dynamic worldbuilding in general.

Overall, there are a variety of aspects in dynamic worldbuilding that can be explored and developed further.

6. Conclusion

Based on the findings previously discussed, it is highly indicated that dynamic worldbuilding in video games has a significant influence on players' engagement and immersive experiences. The identified themes, which includes a sense of realism, random encounters, cause and effect, environmental behavior, NPC interactions, and lore exposition, provide valuable insights on how dynamic elements in worldbuilding enhance the player's experience. Our findings imply that some elements within games significantly enhance players' sense of presence within the game world. The results confirm our hypothesis, showing that dynamic worldbuilding is an important factor in developing a deeper emotional bond and enhancing the immersion of gaming experience. This deeper level of engagement has its origin from the interactive and evolving aspect of dynamic worldbuilding, which allows the players to experience the game world that feels alive and responsive, leading to that deeper and more sustained connection with the game.

While the study's initial purpose sought to focus on selected factors within dynamic worldbuilding, specifically environmental behavior, random encounters, NPC interactions and lore exposition, other elements such as a sense of realism and cause and effect, emerged during the analysis. The additional insights in cause-and-effect systems highlights the importance of meaningful consequences resulting from player actions in games, whereas the sense of realism is recognized as a crucial factor for creating and maintaining immersive experiences. The study further shows that random encounters and environmental changes such as dynamic weather systems and day-to-night cycles are important factors in creating immersive gameplay environments. As is autonomous NPC behavior, such as NPCs with independent routines, which contributes to the sense of a living world. Furthermore, lore exposition that is presented through a combination of methods shows how dynamic elements can complement the narrative and enhance the overall gaming experience.

In conclusion, the insights from this study align with our research question, which aims to understand how dynamic worldbuilding make user experiences in video games more immersive. The findings from this study shed light on the relationship between dynamic worldbuilding and player immersion, providing insights that can further benefit the development of immersive game experiences.

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Appendices

Appendix 1. Survey questions

1. Which age group do you belong to?

2. How long have you been playing video games?

3. How does dynamic worldbuilding influence your emotional connection (immersion) to the game experience?

4. In what ways do you think that dynamic worldbuilding can lead to a more engaging game experience for players? If possible, provide examples from your own experiences in gaming.

5. On a scale of 1 to 5, how much do you feel that environmental behavior and aesthetics contribute to your overall enjoyment in video games?

6. Which aspects of the game's environment do you find most captivating or effective in making the game world feel more real?

7. On a scale of 1 to 5, how much do you feel that random encounters* contribute to your overall enjoyment in video games?

8. How do you perceive the balance between the frequency and difficulty of random encounters in relation to your game experience?

9. On a scale of 1 to 5, how much do you feel that lore exposition contributes to your overall enjoyment in video games?

10. On a scale of 1 to 5, how much do you feel that the portrayal of intelligence and autonomy in non-playable characters (NPCs) contributes to your overall enjoyment in video games?

11. Which method of presenting lore do you find most engaging and effective in enhancing your understanding of the game world?

12. Which aspects of non-playable character (NPC) behavior do you find most appealing or effective in creating an authentic character and enjoyable game experience?

13. Have you ever felt "disconnected" from a game world due to flaws in or absence of dynamic elements? If so, please describe that experience.

Appendix 2. Survey format and questions

Exploring the Influence of Dynamic Worldbuilding on Player Immersion in Video Games

Please read the information below before answering the questions:

For our Bachelor thesis we are researching *dynamic worldbuilding* and its effects on the players' immersive experience in video games.

Dynamic worldbuilding refers to a game world that evolves, reacts or adapts to various factors such as player actions or passage of time. As opposed to *static worldbuilding* where the game world remains largely unchanged regardless of player interaction. Dynamic worldbuilding includes a wide range of elements that contributes in creating a setting that feels alive and engaging.

Examples of dynamic worldbuilding:

- Environmental changes *(day-night cycles, seasons and weather simulations)*
- Random encounters *(surprise features like interactions, combat and quests)*
- Lore exposition *(dialogue, narration and in-game texts such as journals or books, appearances of characters/objects/environments, voice acting, soundscapes and music)*
- Non-playable character (NPC) behavior *(portrayal of intelligence and autonomy, reactions and actions towards the player, and interactions with the environment)*

This survey consists of 13 questions aimed at understanding your perspective as gamers on dynamic worldbuilding and its relation to immersive experiences.

You may respond in either Swedish or English.

Participation is completely anonymous.

Thank you for participating in the study!

1. Which age group do you belong to? *

◯ 12 - 17

◯ 18 - 29

◯ 30 - 39

◯ 40 - 49

◯ 50+

2. How long have you been playing video games? *

◯ Less than one year

◯ 1-3 years

◯ 4-7 years

◯ 8-10 years

◯ More than 10 years

3. How does **dynamic worldbuilding** influence your emotional connection   *
(immersion) to the game experience?

◯ Greatly enhances my connection

◯ Somewhat enhances my connection

◯ No noticeble influence

◯ Somewhat reduces my connection

◯ Greatly reduces my connection

36

4. In what ways do you think that **dynamic worldbuilding** can lead to a more
engaging game experience for players? If possible, provide examples from your
own experiences in gaming.

*

5. On a scale of 1 to 5, how much do you feel that **environmental behavior* and
aesthetics**** contribute to your overall enjoyment in video games?

*

*changing weather systems, seasons, day-night cycles, interactive ecosystem
**lighting, colors, audiovisual effects, ambient audio and music*

	1	2	3	4	5	
Not at all	○	○	○	○	○	Very much

6. Which **aspects of the game's environment** do you find most captivating or
effective in making the game world feel more real?

*

☐ Interactive visuals like realistic weather simulations

☐ Day-to night cycles, the transition from day to night

☐ Thematic consistency in the game environment

☐ Aesthetic design, style and the visual the display of the game world

☐ Övrigt: _____

7. On a scale of 1 to 5, how much do you feel that **random encounters*** contribute
to your overall enjoyment in video games?

*

*encounters that happens without any warning beforehand (such as combat and quests
delivery)*

	1	2	3	4	5	
Not at all	○	○	○	○	○	Very much

8. How do you perceive the balance between the **frequency and difficulty of**   *
random encounters* in relation to your game experience?

○ I prefer frequent encounters that are easy

○ I prefer frequent encounters that are moderately challenging

○ I prefer fewer encounters that are challenging

○ I prefer a balanced mix of encounters, with some being easy and others more difficult

○ I have no preference

○ Övrigt: _____

9. On a scale of 1 to 5, how much do you feel that **lore exposition*** contribute your *
overall enjoyment in video games?
presentation of story or background information through text, visuals and sound

	1	2	3	4	5	
Not at all	○	○	○	○	○	Very much

10. On a scale of 1 to 5, how much do you feel that the **portrayal of intelligence**   *
and autonomy in non-playable characters (NPCs) contribute your overall
enjoyment in video games?

	1	2	3	4	5	
Not at all	○	○	○	○	○	Very much

38

11. Which **method of presenting lore** do you find most engaging and effective in enhancing your understanding of the game world? *

○ Text-based methods (dialogue, narration, in-game texts)

○ Visual-based methods (appearance of characters, objects, environments)

○ Sound-based methods (voice acting, soundscapes, music)

○ Combination of all the above

○ Neither

○ Övrigt: _____

12. Which **aspects of non-playable character (NPC) behavior** do you find most appealing or effective in creating an authentic character and enjoyable game experience? *

☐ Adaptive decision-making

☐ Convincing backstory and motives

☐ Emotional and psychological depth

☐ Interactions with the game world

☐ Lifelike movements and expressions

☐ Reactions to player actions and choices

☐ Unique quirks and personality traits

☐ Varied dialogue responses

☐ Övrigt: _____

13. Have you ever felt "disconnected" from a game world due to **flaws in or absence of dynamic elements**? If so, please describe that experience. *

Ditt svar