

**Pixels and People: Unravelling the Dynamics of Engagement and Disengagement in
Minecraft's Multi-player Realm**

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Abstract

Engagement is often viewed as the holy grail of digital experiences, particularly video games, while disengagement is seen as a consequence of poor design. This study attempts to flip the script, exploring disengagement as a natural part of the user journey rather than a failure of game design. Focusing on the popular open-world game Minecraft, the research investigates dynamics triggering engagement and disengagement in the multi-player mode through the lenses of established frameworks like the Process Model of Engagement and Mechanics, Dynamics, and Aesthetics model. Semi-structured group interviews conducted with 15 participants using Mayring's content analysis, revealed social connections, novelty, progression, goal-driven gameplay, and adrenaline-fueled combat as key drivers that keep players hooked. Yet, paradoxically, the very act of achieving goals, absence of friends, burnout, setbacks, skill gaps, negative interactions, and the demands of the real world can trigger a powerful urge to disengage. Far from a design flaw, this research reveals disengagement as a vital component of user autonomy. By redefining success beyond mere engagement metrics, the study paves the way for responsible gaming practices that empower players to make informed choices about their level of involvement. It beckons us to embrace a holistic vision of genuinely sustainable, ethical, and meaningful digital experiences that respect user autonomy and cultivate healthy engagement patterns.

Keywords: engagement, disengagement, Minecraft, game dynamics

Introduction

Successful computer games have a fantastic power to hook players in, keep them glued to the game, and make them want to keep playing. It is not sufficient to encourage a player to pick up the game; if the engagement is not sustained, the player will not continue to play. On the other hand, disengagement is just as important as engagement. Disengagement refers to when the user withdraws from interacting with a system, whether temporarily or permanently (O'Brien et al., 2022). In a play session, engagement and disengagement are a cycle. Engagement is when the player gets immersed and entertained by the game. Disengagement is also natural since people need breaks during the game, whether going about their daily lives or satisfying a physical need (getting water or food). After this disengagement, the game needs to have the ability to re-engage the players to pick up the game once again. Understanding disengagement contributes to promoting healthy gaming habits. It can mitigate conflicts over playtime and potentially lessen the risk of excessive game use (Alsheail et al., 2023). Researching engagement and disengagement in games is crucial for understanding player behaviour (Van Rooij et al., 2021), improving game design (Xie et al., 2015) and promoting player wellbeing (Van Rooij et al., 2021). Understanding why players disengage can also help mitigate conflicts over gaming time, ensuring a more enjoyable and sustainable gaming experience for all. Although players' behaviours play an essential role for both the game and the player base, studies on engagement and disengagement are still under-researched.

Background

Since the introduction of computer games in the 1970s, the landscape of leisure activities has been significantly transformed due to the influence of digital gaming (Boyle et al., 2012). This has opened a new horizon for the entertainment market. In 2022, the worldwide market for video games was approximated to be valued at USD 217.06 billion, with projections indicating a yearly growth rate of 13.4% in 2030 (Video Game Market Size, Share and Growth Report, 2030, n.d.). Thanks to technological advancements in multi-player gaming, networked gaming, and particularly mobile gaming, video games have expanded their audience (Engelstätter & Ward, 2022). Video games serve as a form of entertainment and can facilitate "learning, skill development, and changes in attitudes and behaviours" (Boyle et al., 2011). The game itself needs engaging gameplay to make entertaining games that attract players (Schoenau-Fog, 2011). Engagement serves as the lifeblood that sustains player interest and fuels immersive experiences

(O'Brien & Toms, 2008). As a result, engagement in video games has gained attention and is now a significant area of research. Immersion (Jennett et al., 2008), flow (Chen, 2007), "fun" (Koster, 2013), enjoyment (Mayes & Cotton, 2001), and presence (McMahan, 2003) are just a few of the concepts that can be linked to the multidimensional concept of engagement in games (Filsecker & Kerres, 2014).

While engagement has been extensively researched in academia, disengagement remains surprisingly under-explored. This knowledge gap is concerning since disengagement is just as crucial as engagement in overall user experience, especially in the context of gaming. Disengagement is when the player's interest starts to fade, leading to a stop of interaction with the technology or game (O'Brien & Toms, 2008). If players fail to disengage from the game, in other words, if players don't lose interest and continuously play the game for long periods, it could lead to unhealthy gaming habits or addiction (Milani et al., 2018). The prevailing discourse within the realm of games research has often posited disengagement due to deficient game design, which fails to foster sustained player involvement (Alsheail et al., 2023). Instances, where players disengage from a game, are frequently viewed through a critical lens that attaches a negative connotation to the phenomenon. Player disengagement is commonly framed in terms like 'attrition,' which casts it as an undesirable outcome. Most research on player disengagement adopts a restrictive perspective, seeing it as players quitting the game because of some external factor (Alsheail et al., 2023). Nevertheless, O'Brien and colleagues (2022) argue that we should not only look at it negatively. Sometimes disengagement is just temporary - players may disengage for some time because they are satisfied with their previous gameplay sessions. It can actually represent players exercising their own autonomy in how they engage. This alternative lens highlights how nuanced disengagement can be. We need a more holistic understanding of what causes it, how it plays out, and what it means for players and developers.

Disengagement is not merely the antithesis of engagement; it is a complex and multifaceted process that can significantly impact the overall user experience and long-term engagement with a game or digital platform (O'Brien et al., 2022). By ignoring or simplifying disengagement, critical factors are overlooked by researchers and game designers, such as burnout, unhealthy gaming habits and prolonged disengagement from the game, which could ultimately lead to the unsustainability of the gaming experience (Lee & LaRose, 2007). Therefore, it is crucial that disengagement is researched through a more positive lens to

understand its intricate nature and recognise its potential to inform the design and content of games to be more engaging and balanced, leading to a sustainable gaming experience. By shedding light on this under-researched aspect, researchers and designers can gain valuable insights into creating immersive and fulfilling gaming environments that foster healthy engagement patterns and respect users' autonomy and preferences.

When understanding the factors that drive engagement and disengagement in games, the sandbox genre offers an interesting case study. Sandbox games are generally designed to provide the players with a high degree of freedom to explore and interact with the game content in an open-ended manner. This freedom can be a powerful driver of engagement, touching into the player's innate curiosity and desire for discovery. However, if players become too immersed in the game environment's never-ending exploration, it could lead to unhealthy long hours of play. On the other hand, this characteristic could also trigger disengagement if not balanced carefully. Players could struggle to stay interested in the game without explicit tasks or achievements. The right balance between engagement and disengagement factors is critical for the game's sustainability. One example of a popular and influential sandbox game is Minecraft, a game created by Mojang Studios.

Literature Review

Balancing engagement and disengagement to ensure healthy interactions between players and games is a difficult task since one has to know what makes players engaged, how this engagement transitions to disengagement and what makes the players want to start playing again, restarting the whole cycle. A study by Schoenau-Fog (2011) found that there were four main components to engagement: objectives, activities, accomplishments and effects. These results significantly contribute to our understanding of how engagement is created. However, the components that make up disengagement are still unknown, especially how it would look in a player's interactions with the game. Investigating how each stage in the engagement cycle emerges through a player's experience would provide valuable information to design sustainable gaming experiences. To explore what an engagement cycle through the lens of player interactions with the game, two theories were utilised: The Process model of Engagement (O'Brien & Toms, 2008) and the Mechanics-Dynamics-Aesthetics (MDA) framework (Hunicke et al., 2004). The Process model of Engagement describes the stages of engagement, while the

MDA theory is a systematic tool that allows the study to examine how player experience – dynamics influence player emotion.

Process model of engagement

The Process Model of Engagement (O'Brien & Toms, 2008) describes users' stages when engaging with technology and digital media. It outlines four key stages in engagement: Initial engagement, Sustained engagement, Disengagement and Re-engagement. It proposes that users initially experience a point of engagement where their attention and interest are captured. If specific attributes like aesthetics, novelty, and usability are present, users can transition to sustained engagement, actively maintaining involvement over time. However, as interest fades, disengagement may occur, with users shifting their attention away from the technology or experience. Significantly, the model acknowledges that after disengagement, re-engagement is possible if factors re-attract the user's interest.

The central premise suggests that engagement is not a static state but instead fluctuates dynamically as users fluidly transition between stages of sustained involvement, disengagement, and potential re-engagement. This fluidity is influenced by the presence and degree of certain attributes. By examining these distinct stages and influencing attributes, the model provides a framework for analysing and understanding the factors that lead users to become engaged with technologies and digital experiences, maintain that engagement over time, disengage, or ultimately re-engage.

The Process Model of Engagement offers a structured lens through which to view the evolving nature of engagement with digital media. Applying this model enables tracking how a user's engagement progresses temporally - from the initial spark of attraction to deep, sustained immersion and potentially to disengagement. This longitudinal perspective facilitates a more nuanced comprehension of the factors underpinning long-term engagement with games and other interactive experiences, moving beyond solely examining the immediate experiential flow state.

MDA Framework

The MDA framework, proposed by Hunicke, LeBlanc, and Zubek (2004), has become an influential analytical tool in the field of game design and game studies. This framework deconstructs games into three essential components: Mechanics, Dynamics, and Aesthetics. Mechanics refer to the particular rules, components, and data representations that govern the game's behaviour. These include game elements such as game rules, player actions, and

algorithms (Hunicke et al., 2004). For example, in Minecraft, mechanics encompass the crafting system, resource gathering, and block placement/destruction rules. Dynamics describe the acting behaviour of the mechanics in tandem with player inputs and interactions (Hunicke et al., 2004). They emerge from the interplay between the rules and player actions. Examples include the strategies players employ, the patterns that arise during gameplay, and the narrative experiences that unfold (Sicart, 2008). Aesthetics refers to the emotional responses or reactions evoked in the player during the game (Hunicke et al., 2004). These include experiences such as sensation, fantasy, narrative, challenge, fellowship, discovery, expression, and submission. Aesthetics arise from the dynamics created by the mechanics and player interactions. Notably, the MDA framework suggests a feedback loop, where aesthetics influence and shape the dynamics, which in turn shape and inform the development of mechanics (Hunicke et al., 2004; Sicart, 2008). This iterative process is crucial in game design, as it allows for the refinement and adjustment of mechanics to achieve desired aesthetic experiences.

The MDA (Mechanics, Dynamics, Aesthetics) framework offers a valuable analytical lens for this research by systematically examining how the dynamics of Minecraft influence player behaviour, emotions, and enjoyment—core factors impacting engagement and disengagement. As an established model in game studies, the MDA framework connects game mechanics to player dynamics and resulting aesthetic experiences, aligning well with the research objective. Complemented by the Process Model of Engagement, applying the MDA framework facilitates a comprehensive analysis grounded in game design principles, ultimately informing strategies for fostering engaging gaming experiences.

Present Study

Given the critical importance of comprehending the nuances of both engagement and disengagement in gaming experiences, this study turns its attention to the immensely popular and influential open-world sandbox game Minecraft. The game was chosen for its unique blend of creativity, exploration, and player autonomy (Cipollone et al., 2014). Minecraft is an ideal game environment to explore the factors and dynamics that trigger engagement and disengagement. With its open-ended gameplay and vast gameplay dynamics, Minecraft provides players with unparalleled freedom to craft their own experiences (Nguyen, 2016). The game offers players opportunities for self-expression, goal setting and exploration by constructing structures and exploring different biomes such as caves or jungles (Keller, 2024). The vast array of gameplay

elements and the ability to shape one's own gaming experience make Minecraft a desirable subject for investigating the drivers of engagement and disengagement.

While Minecraft offers a rich, open-ended experience in both single-player and multi-player modes, this study zeroes in on the multi-player realm. The decision to concentrate on the multi-player facet is driven by recognising that social interactions and shared experiences are pivotal in shaping engagement dynamics (Lu & Churchill, 2014). The multi-player dimension of Minecraft introduces a unique set of dynamics that extend beyond the confines of a single-player experience. Collaboration, competition, and the ability to interact with other players in real-time add layers of complexity and richness to the gameplay experience (Winn & Fisher, 2004). On the other hand, multi-player is also significant for disengagement due to the potential for negative social interactions (JetLearn, 2024). Issues such as conflicts and peer pressure can lead to frustration (Satija, 2016), stress (Agoston & Rudolph, 2016), and a diminished gaming experience (Donthu et al., 2023), ultimately causing player attrition. These social elements have the potential to profoundly influence players' motivations, goals, and overall sense of engagement or disengagement (Bosten, 2009).

Research aim and Research question

Through an in-depth exploration of engagement and disengagement dynamics in Minecraft, this study aims to contribute to the broader understanding of game dynamics and player engagement and disengagement, ultimately paving the way for the creation of more immersive, balanced, and sustainable gaming environments that respect user autonomy while nurturing enduring engagement.

Therefore, the study's research question is: Which game dynamics trigger engagement and disengagement in multi-player Minecraft?

Methods

With the aim of finding which dynamics trigger engagement and disengagement in Minecraft, an inductive approach was implemented: data collection is used to develop general theories or hypotheses through the identification of patterns and themes. The specific methods used to answer the research question will be described in this section.

Sampling

A non-probability sampling method - purposive sampling was used to select individuals to participate in the study. Purposeful sampling strategies aim to include only certain types of

cases of potential participants in the research study's final sample (Campbell et al., 2020).

Participants were recruited through social media platforms. A recruitment message was posted outlining the purpose of the study, selection criteria, and instructions for expressing interest in participating.

Participants

All participants ($N = 15$) were older than 16 years and had experience playing Minecraft multi-player mode. Most participants were male (86.7%), and only a small minority were female (13.3%). The average age of the participants was 21.9 years old. The majority of the participants were from Europe (12 people), two people came from Asia, and one person was from North America. Participants were assigned to groups to conduct group interviews with.

Research design

The research seeks to explore which dynamics play a part in engagement and disengagement; therefore, an exploratory research design was applied. An exploratory research design seeks clues or evidence to uncover events or ongoing occurrences. Researchers utilise various sources to gain understanding and clarity, pursuing insights and explanations along the way (Elman et al., 2020)

Data collection

Data was collected via semi-structured group interviews and surveys. Group interviews were the dominant technique, providing insight into which game dynamics were related to engagement and disengagement and how the participants would improve engagement and disengagement. The surveys were sent after the interviews were conducted to provide participants with a means to share information they feel uncomfortable talking about in front of others and information they want to add to the interview.

All participants were told that the research concerned two parts: the group interview and a survey concerning which dynamics in Minecraft trigger engagement and disengagement, which would take around forty-five minutes. Before participating in the interviews, participants were given an informed consent stating the purpose of the study, the procedures involved, and their rights as participants. They were informed that participation is voluntary, and they could withdraw from the study at any time without consequence. The group interviews were conducted using Discord. After the group interview, the participants were asked to complete a survey via Qualtrics. Participants were assigned pseudonyms during data analysis to protect their privacy.

Group interviews

Semi-structured interviews were chosen as the primary data collection method since they combine predefined questions with the flexibility to explore topics in more depth as they arise during the conversation (Adams, 2015). This approach allows for a balance between consistency across interviews and the ability to adapt to the interviewee's responses, allowing the researcher to explore what dynamic the players perceive with each engagement stage.

With the research question in mind, the interview questions were developed to find out which player dynamics occurred in each stage of engagement. To get to know the participants and set the flow of the group interview, a question about what a general play session in Minecraft looked like was developed. After, the study developed questions about engagement. These questions were divided into four main points according to the Process model of Engagement (O'Brien & Toms, 2008): Initial engagement, Sustained engagement, Disengagement and Re-engagement. To receive the whole story of the player's experiences, only open-ended questions were used to ask about the player's experience in each stage. Furthermore, to understand what could facilitate Sustained engagement and Disengagement, a question about what the players think could support each stage was generated. To understand how multi-player affects engagement and disengagement, a question regarding how the participants feel about playing with others influences their engagement and disengagement was developed.

The group interview questions (See Appendix 1) were developed with eight questions, consisting of three main themes: general information about a typical Minecraft play session (e.g., Can you describe a typical Minecraft session), the different stages of engagement (e.g., How do you get engaged in a game session) and the effect of multi-player on engagement (e.g., How does playing in multi-player affect your engagement). The questions about the four stages of engagement were consistent with the Process model of Engagement by O'Brien & Toms (2008).

The protocols aimed to maintain a consistent line of inquiry, but due to the dynamic nature of the questions, each conversation was expected to be unique. Consequently, specific conversational questions were asked in each interview to meet the inquiry's needs while enhancing the conversational quality of the interview (Yin, 2009).

Survey

The survey contained nine questions, consisting of demographic questions and questions relating to the content of the interview (See Appendix 2). The participants were asked if they

wanted to add any information to the engagement stages or had anything to add in general to the research (e.g., Do you have anything to add to the interview regarding game engagement?). A helpline for peer pressure and video game addiction was provided at the end of the survey.

Data analysis

The data collected from the interviews were analysed using Mayring's (2015) qualitative content analysis approach. Mayring's Qualitative Content Analysis is a systematic and rule-governed method for interpreting textual data by developing and applying categories through iterative and context-sensitive processes (Mayring, 2015). This approach allows the study to explore and identify the different categories of dynamics involved in the four stages of engagement.

The audio recordings of the interviews were transcribed verbatim. The unit of analysis was defined as interview responses comprising paragraphs or sections of text relevant to the research questions. All the transcripts were reviewed to get an overall sense of the data. This process involved multiple readings to gain a holistic understanding of the participants' experiences. Through open coding, researchers systematically identified and labelled meaningful data segments. Codes were developed inductively based on recurring ideas, concepts, and phrases within the transcripts. Building upon the codes generated through open coding, researchers grouped similar codes into broader categories and themes. This process allowed for the emergence of categories organically from the data. The coding scheme was reviewed by other researchers and continuously adjusted until an agreement was met between researchers. Coded data were then summarised and condensed to highlight the most salient themes within each category. Representative quotes were selected to illustrate each theme.

Results

The engagement experiences described by participants consisted of simultaneous, multi-layered interactions between the individual, other players and their environment within the game of Minecraft. In seeking to understand the meaning of these interactions, we came to view participants' engagement experiences through the metaphor of a journey. Like the evolving stages of a journey, engagement with Minecraft involved distinct phases that profoundly affected our participants: most reported experiencing varied, dynamic, and deeply immersive engagement reactions that were influenced by multiple factors.

Initial engagement (IE)

The first stage of the journey starts with Initial engagement. IE can occur from the moment the players start getting drawn into the game, whether it be content or a friend's invitation sparking their interest, to the first few minutes to hours of the game. This stage is characterised by the player's first interactions with the game. This stage's duration depends on how quickly the player can grasp the basic mechanics and get used to the game's concept. Finding which dynamics trigger IE allows us to explore what initially attracts players to the game.

IE triggers

Table 1

Factors that trigger Initial Engagement (IE)

Code-group	Code	Description	Person count	Mention count
Triggers	Friends (IE)	Invitations from friends or peer pressure to play Minecraft	10	14
	Combat (IE)	Player vs Player (PvP) Fighting game mobs	4	10
	Freedom	The game's open-ended nature and not mandatory activities.	4	8
	YouTube Inspiration (IE)	Inspiration from YouTube content	3	3
	Novelty (IE)	New in-game elements	2	2
	Progression (IE)	Improvement and achievement	2	2

Six factors were identified as factors that triggered Initial Engagement, as seen in Table 1. The codes are arranged from the most number of people quoting the code and most mentioned to the least number of people mentioning the code and least mentioned. A further description of the codes with example quotes will be explored.

Friends (IE)

The journey often begins with a spark ignited by social influences, as mentioned by ten people across 14 instances. Many participants recounted how friends played a pivotal role in drawing them into Minecraft, not only through invitations but also through peer pressure. Participant 1 vividly described, "For playing on the Minecraft server, it is just a friend or myself just saying like, "Hey, I am kind of down to play Minecraft, do you want to start playing", and we play". Another noted:

Since it is multi-player, when I decided and planned to meet with some friends at this point, and we were going to play at that time, they were always playing, and I was not really that into it. I am not playing because I want to, but at that point, I'm playing because that's the scheduled time. Obviously, I still love Minecraft, so there's still a good time. (P7)

This illustrates how the game's social appeal acts as a catalyst, initiating engagement through both positive invitations and the subtle pressures of social conformity.

Combat (IE)

Additionally, the thrill of combat, specifically player-versus-player (PvP) combat, further fuelled initial engagement. Four people mentioned this across ten instances. A participant shared, "I'm engaged because I like doing PvP, so the PvP is player-versus-player. So, I like fighting other people. So, combat that engages me" (P4). This element highlights how the competitive and survival aspects of Minecraft draw players into the game, providing an adrenaline-pumping experience right from the start.

Freedom

The game's open-ended nature and the variety of activities it offers were compelling reasons for initial engagement, cited by four people across eight instances. One participant noted: It doesn't force you to do anything you don't want to, and you can basically do whatever you want. You go farming, you go mining. It also has a variety of mobs of friendly animals, and it gives you the freedom to do whatever you want. (P13)

This freedom to choose one's path within the game world attracted players, making them feel in control of their gaming experience.

YouTube inspiration

Inspiration from YouTube content also played a significant role, noted by three people in three instances. One participant explained, "For me, it is when I see something from a YouTube video [and] I'm like 'I want to do that in Minecraft'. I see something and be like, 'Yeah, I want to build that.'" (P2). The exposure to creative and engaging Minecraft content on YouTube spurred players to explore and recreate what they had seen, emphasising the impact of external media on initial engagement.

Novelty (IE)

For others, the allure of new content and experiences was irresistible. This code was cited by two people in two instances. One participant noted, "Usually, I get engaged by new updates coming out because they've added a bunch of new stuff that I want to explore" (P3). The promise of discovery and exploration frequently served as a powerful motivator, drawing players into the Minecraft world. This novelty aspect underscores the importance of fresh content in capturing players' initial interest.

Progression (IE)

The prospect of making progress and obtaining better gear triggers initial engagement for some, mentioned by two people in two instances. One participant mentioned, "What engages me is making progress, like getting better gear" (P4). The game's structure of continuous improvement and achievement helped to pique the players' interest.

Sustained Engagement (SE)

The second stage of the journey follows with Sustained Engagement. This phase in Minecraft can last from weeks to months or even years for dedicated players. SE is characterised by the deepening of the player's understanding of the game (e.g., exploring the environment, game mechanics, and large projects). This stage is marked by regular play sessions, often lasting several hours at a time. Uncovering which dynamics trigger SE and what could support this stage ensures the game can design captivating content to keep players interested in the game.

In examining the dynamics of Sustained Engagement in gaming, this section is organised into two pivotal categories: triggers and potential support. Triggers encompass the specific elements and dynamics that inherently motivate players to remain actively engaged with the game over an extended period. Conversely, potential support refers to the strategic features and mechanisms that game developers can employ to foster continued engagement. By delving into these triggers and support mechanisms, we can develop a nuanced understanding of the factors

that underpin long-term player engagement, offering valuable insights into effective game design and player retention strategies.

SE triggers

Table 2

Factors that trigger Sustained Engagement (SE)

Code-group	Code	Description	Person count	Mention count
Triggers	Friends (SE)	Talking and playing with friends in the game	12	12
	Progression (SE)	Improvement and achievement	9	13
	Goal-based engagement	Personal projects and goals in the game	7	11
	Novelty (SE1)	New in-game elements	4	4
	Combat (SE)	Fighting other players and mobs	3	4

Five factors were identified as Sustained Engagement triggers, as presented in Table 2. The codes are ranked in descending order based on two criteria: the number of individuals citing each code and the frequency of mentions. Those with the highest number of people quoting them and the most frequent mentions appear first, while those with the fewest citations and mentions are listed last. Further details and examples of the codes will be discussed.

Friends (SE)

As players settle into the game, sustained engagement often hinges on continuous social interaction. Playing with friends is a key factor sustaining engagement, cited by 12 people across 12 instances. A participant shared how playing with friends helps them become more engaged:

Playing with friends definitely helps me become engaged for my part, which helps me get into the game. There's this camaraderie going on in the beginning. Everyone's working towards a common goal. And I think the multi-player aspect is really good at that. So, I think, for me, it usually adds more than it takes away. I feel like the social aspect, being

able to talk to my friends and leading up a task, can really help. I probably find some parts of the game more fun, [which] P8 thinks are boring and the other way around. Then I get to do more of the things that I think are fun while someone else takes care of what I think is boring, but they think that's fun. And we all get to do more of the fun stuff while getting rid of the boring stuff. (P7)

This underscores the critical role of social bonds in maintaining interest. These interactions extend beyond simple companionship, fostering a shared experience that enhances the game's enjoyment and longevity.

Progression (SE)

Continual progression within the game remained a significant factor, cited by nine people across 13 instances. One participant shared how getting better at the game triggered their engagement:

It's really rewarding to watch yourself get better, whether that's in hours, days, weeks, months, whatever it is. Same thing for survival, to be honest. You start out not knowing how to do anything. And then, eventually, you get to the point where you can just run things down into what would have taken you months or weeks before in a matter of hours. I think it's getting better at the game, and seeing and knowing that you're getting better at the game is what I really enjoyed about it when I was really engaged. (P11)

The ongoing quest for improvement and reaching new stages in the game contributed to long-term engagement.

Goal-based engagement

Personal projects and goals also played a significant role in sustaining engagement, as mentioned by seven people in 11 instances. A participant detailed, "I just give myself like huge projects to make on the world. And yeah, that kind of keeps me engaged" (P3). These self-directed tasks provided a sense of purpose and long-term commitment. The satisfaction of completing large-scale projects or achieving personal milestones kept players deeply involved.

Novelty (SE1)

Experiencing new content and updates also remained vital for sustaining interest, as mentioned by four people in four instances. One participant remarked, "I think the biggest factor for me is having new experiences. I don't like doing the same thing a second time" (P6). This continuous influx of new features and updates ensured that the game remained fresh and exciting, preventing boredom and maintaining engagement.

Combat (SE)

The desire to overcome combat challenges, both PvP and against mobs, kept many players motivated. Three people noted this code across four instances. "The Ender dragon and the wither are the only things that would keep me engaged to try and beat them" (P2). Another participant shared, "Fighting the Ender Dragon or working until there and then just do things like building very big buildings or towers. Each of us can be allowed in castles, or we can have PvP turned on, have our tournament, or do something like that" (P13). This ongoing pursuit of advancement highlighted how in-game milestones and achievements are crucial for sustained engagement, providing players with a steady stream of goals to strive for.

SE potential support

Table 3

Factors that potentially support Sustained Engagement (SE)

Code-group	Code	Definition	Person count	Mention count
Potential Support	Novelty (SE2)	New in-game elements	8	8
	Daily quests	Daily tasks	3	3
	Material collection support	A system providing players with checklists and item counts necessary for crafting or building in the game	2	2
	Randomisations	Random events, varying quest lines, or different item drops	2	2
	Multi-player management	Organising tournaments and improving anti-cheat systems	2	2
	User interface (SE)	Reduce the number of steps required to start playing	2	2

Achievements play a role in multi-player	Visible rewards or status symbols that show up for other players	2	2
Mandatory progression	Mandatory progression in the game. Mandatory quests to unlock new content or advance through the game	1	1

Eight factors were found to potentially support Sustained Engagement, as listed in Table 3. The codes are listed in order of popularity and frequency. They start with those cited by the most people and mentioned most often and end with those referenced by the fewest individuals and discussed least frequently. The following section will explain the codes and the representative quotes.

Novelty (SE2)

Eight people across eight instances noted that regular updates are crucial for keeping the game fresh and interesting. Updates can include new biomes, features, or content that provide players with new experiences and challenges. As one participant stated, adding "a bunch of new biomes like with a bunch of stuff to explore" keeps the game engaging. Frequent updates prevent the game from becoming stale and offer players new reasons to return and explore the updated content.

Daily Quests

Daily quests can significantly enhance sustained engagement by providing players with recurring objectives, as noted by three people across three instances. This mechanism ensures that players have a reason to return to the game regularly. As one participant mentioned, having "something to do every day" keeps the game engaging and gives players continuous goals to work towards. Daily quests create a routine, encouraging players to log in daily and complete specific tasks, thereby maintaining their interest and involvement over time.

Material Collection Support

Material collection support involves providing players with checklists and item counts necessary for crafting or building in the game. This system can help players manage their resources efficiently and set clear goals for material gathering. One participant highlighted the usefulness of having "material checklists, and with like numbers, like how many items you have to collect." Such support can reduce the cognitive load on players, making the gameplay

experience smoother and more enjoyable, which in turn sustains their engagement, as cited by two people in two instances.

Randomisations

Incorporating randomisations into the game can enhance replayability by ensuring that each playthrough offers a unique experience. This factor can include random events, varying quest lines, or different item drops. A participant noted the appeal of having "randomisations and also more ways to do things" as a way to keep the game interesting. Random elements can surprise players and maintain their curiosity, thereby supporting sustained engagement, as cited by two people across two instances.

Multi-player Management

Effective multi-player management, including organising tournaments and improving anti-cheat systems, can enhance the multi-player experience and keep players engaged, as mentioned by two people in two instances. Participants suggested that more "tournaments events on Hypixel" and a "working anti-cheat" system would significantly improve their multi-player experience. Enhancing the social and competitive aspects of multi-player gaming can motivate players to stay engaged to compete and collaborate with others.

User Interface

Streamlining the user interface to reduce the number of steps required to start playing can make the game more accessible and less frustrating for players. One participant mentioned the inconvenience of having "too many steps to open the game" and suggested removing the launcher to simplify the process. Improving the user interface can enhance the overall user experience, making it easier for players to jump into the game and stay engaged, as noted by two people across two instances.

Achievements play a role in Multi-player.

Achievements that impact multi-player interactions could sustain engagement, cited by two people in two instances. Earning achievements can provide a sense of accomplishment and recognition within the community. Multi-player achievements often come with visible rewards or status symbols, which can drive players to continue playing to showcase their skills and progress. A participant mentioned that achievements in multi-player scenarios can motivate them to engage more deeply with the game, as these accolades often represent both personal and collaborative success. This system encourages players to complete specific challenges or

milestones, fostering a competitive yet cooperative environment that sustains long-term interest and involvement.

Mandatory Progression

Adding required progression elements could sustain engagement for some, as mentioned by one person in one instance. These elements can compel players to continue engaging with the game to unlock new content or advance through the game's story or levels. A participant expressed that mandatory progression would motivate continued play: "If they added something mandatory for progression, then I would play it." This approach ensures that players remain focused on achieving specific milestones, thereby maintaining their long-term interest in the game.

Disengagement

The third part of the journey continues with Disengagement. Disengagement in Minecraft can occur at various points in the player's time with the game. Although it can vary among players, this stage is typically after several months of regular play. This phase is characterised by the player exhausting the game elements, completing a major project or the need for a break. The open-ended nature of Minecraft means disengagement comes gradually instead of instantly. A player could reduce their play time until coming to a stop. On the other hand, this stage might not fully occur if the player continues to find inspiration. Exploring the dynamics that trigger and support disengagement can help us identify what makes players disinterested in the game and what could support disengagement when the player has been playing for long periods of time.

This section delves into the factors contributing to disengagement in gaming, dividing our analysis into three critical categories: triggers, potential support, and suppression. Triggers are the specific elements and events that lead players to lose interest and disengage from the game. Potential support refers to the strategies and features that game developers can implement to facilitate a healthy exit from the game. These mechanisms are designed to encourage healthier gameplay habits by helping players disengage in a structured and mindful manner. Suppression encompasses the factors that suppress disengagement, keeping players hooked even when they might otherwise want to stop. By exploring these triggers, support mechanisms, and suppression factors, we gain a comprehensive understanding of the dynamics driving player disengagement and the ways to promote balanced and sustainable gaming practices.

DE triggers

Table 4*Factors that trigger Disengagement (DE)*

Code-group	Code	Description	Person count	Mention count
Triggers	Burnout	Extended play periods or repetitive gameplay	10	15
	Big setback	Significant losses or failures within the game that undo progress or achievements	10	11
	Real-life activities	Responsibilities and activities outside of the game that demand the player's time and attention	8	9
	Friends not there	The absence of friends, lack of social interaction	7	10
	No progression	The player's efforts are not leading to significant advancements or achievements within the game, or there is simply no more gameplay to progress	7	9
	Big skill difference	Disparity in skill levels between players	5	6
	Completion of tasks	Accomplishment of significant tasks	4	4
	Big task ahead	Facing large, tedious tasks or the anticipation of extensive or monotonous tasks	4	7
	Playing with strangers	Playing in multi-player with unfamiliar people	3	4
	Lack of inspiration	The absence of ideas or activities to do	3	3

Ten factors were found to trigger Disengagement, as seen in Table 4. The arrangement of codes follows a hierarchical pattern, beginning with the most widely quoted and frequently referenced and concluding with those least cited and discussed. The codes will be explained in detail with example quotes.

Burnout

Burnout refers to the feeling of exhaustion or boredom from extended, repetitive periods of gameplay. When players engage intensively with the game for a prolonged period, they may experience fatigue and a subsequent drop in motivation, as mentioned by ten people in 15 instances. "It's either when I've been playing so long that I just kind of get sick of it" (P7), expressed one participant, capturing the essence of burnout.

Big setback

A big setback refers to significant losses or failures within the game that undo progress or achievements. These setbacks can be demoralising and lead to frustration, causing players to disengage as they may feel their efforts have been wasted, as cited by ten people across 11 instances. "Dying and losing all my stuff really makes it really easy to leave the game for me. Because it's just really discouraging to like kind of start all over with my inventory." (P3)

Real-life activities

Real-life obligations encompass responsibilities and activities outside of the game that demand the player's time and attention. These can include work, school, family commitments, and other personal activities. As players prioritise these real-life duties, their engagement with the game naturally decreases. "The most popular reason would probably be like it's already too late. It's already 3-4 am in the morning, we go to school at six, seven, we better stop" (P13). Other commitments, like needing sleep to disrupt engagement, were mentioned by eight people across nine instances.

Friends not there

The absence of friends relates to the lack of social interaction within the game. Many players rely on their friends for a shared gaming experience, and when friends are not available to play, the game loses a significant portion of its appeal, as noted by seven people in ten instances. "We just stop playing, or everyone just stops playing, and no one gets on the server, then I just stop as well." (P5), shared one participant, highlighting the social aspect of disengagement. This lack of companionship and collaborative gameplay can lead to disengagement, as players find the game less enjoyable without their usual social interactions.

No progression

No progression refers to the feeling that the player's efforts are not leading to significant advancements or achievements within the game, or there is simply no more gameplay to progress. When players feel stuck or perceive that their actions do not result in meaningful

progress, they can become frustrated and disengaged. A participant shared, "There's nothing new to explore if you've done basically everything you want to do and built everything you want. There's not much left to do except for doing things to your own liking or preference, and those things can run out as well. And when everything runs out, then it gets boring." (P13). The inability to progress further in the game leads to disengagement, which was mentioned by seven people in 9 instances.

Big skill difference

Big skill difference relates to the disparity in skill levels between players, which can affect enjoyment and engagement. When players feel outmatched by significantly more skilled players or, conversely, find themselves far superior to others, it can lead to frustration or boredom, resulting in disengagement. This can be clearly seen when a participant shares, "So as the average skill level has gone up, I've kind of stayed where I am. So you join a game. Everybody is better than they used to be, and you feel kind of washed. I don't know if you know that word, but it's just kind of demotivating getting in the game" (P11). Five people noted this code across six instances.

Completion of tasks

Completion of tasks refers to the moment when players finish significant projects or achieve major milestones within the game. This often leads to a temporary drop in interest as the immediate goals or objectives that motivate their engagement are no longer present. "Usually I get disengaged if I finish like a project. So if I was working on something, and I finished it, and I don't really want to do something else, I stop playing it" (P2). Without new challenges or projects to undertake, players may feel a lack of purpose, resulting in disengagement, as mentioned by four people across four instances.

Big task ahead

Facing large or tedious tasks refers to the anticipation of extensive or monotonous activities that need to be completed within the game. The prospect of engaging in time-consuming or repetitive tasks can be demotivating, leading players to temporarily disengage as they are not inclined to tackle these overwhelming challenges. Four people across seven instances cited this code. One participant stated, "I usually get disengaged when I have to collect too many materials. It's very boring just going around and getting, I don't know, wood or mining. It's just very annoying. I have to do everything manually." (P12).

Playing with strangers

Playing with strangers can refer to demotivation or lack of connection when playing with unfamiliar people. The disengagement and demotivation are clearly explained by a participant: "You're playing with unknowns, randoms, that could be more demotivating when people are ruining your builds and stealing from you and all that. That's kind of like a big throw-off where it's not fun anymore because you're kind of progressing but never progressing because everything is getting destroyed." (P8). Many players prefer gaming with known friends because it enhances the social experience. The impersonal nature of playing with strangers can make the game less enjoyable, leading to disengagement, as cited by three people in four instances.

Lack of inspiration

A lack of inspiration involves difficulty in coming up with new ideas or projects to pursue within the game. Players who struggle to think of fresh, exciting activities may find themselves feeling stagnant, which can lead to disengagement. "I basically only copy other people, and I struggle to think of new projects. It just gets boring. I don't know what to do. And then I just quit" (P4), highlighting how a lack of inspiration can lead to temporary disengagement. Without fresh ideas to pursue, players found it challenging to maintain their engagement. Struggling to think of new goals/projects results in disengagement, as noted by three people across three instances.

DE potential support

Table 5

Factors that potentially support Disengagement (DE)

Code-group	Code	Description	Person count	Mention count
Potential Support	Reminder	In-game reminders about how long the player has been playing	4	4
	Timer	In-game timer	4	4
	Easier game	Making the game easier, offering little stimulation	2	2
	Task accomplishment	A task for the players to complete or giving them a sense of accomplishment	2	2

User interface (DE)	Simplifying the user interface	1	1
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Five factors were identified to potentially support Disengagement, as listed in Table 5. Codes are sorted from most prevalent to least prevalent, with prevalence determined by both the number of unique individuals referencing each code and the total number of times each code is mentioned. The following section will explain the codes and their representative quotes.

Reminder

In-game reminders about how long the player has been playing can act as a promoter for disengagement, helping players avoid excessive gaming sessions. Participants indicated a preference for such reminders as they encouraged taking breaks. One participant noted, "Something in the game to show how long you've been playing. There are a lot of people who play Minecraft for a lot of hours. It could definitely help them and show them how much they have already played and how much they need to get off." (P10). These reminders can help players manage their time better and prevent burnout, as cited by four people across four instances.

Timer

Adding a timer in the game can help players disengage, as cited by four people across four instances. Timers can provide a clear endpoint, making it easier for players to take breaks and manage their playtime. One participant stated, "You press that leave in ten minutes button, and then it starts the timer, and you can see it up in the corner. It counts down. And then, when there's one minute left, it notifies you, "You have one minute" (P7). Another participant mentioned, "If you could add maybe a timer or like, kind of like an alarm in the game" (P8). Implementing timers can support players in making conscious decisions about their gaming duration, thus promoting healthier gaming habits.

Easier game

Making the game easier could make disengagement easy for some players, as mentioned by two people in two instances. The challenge level of a game can significantly impact player engagement. If a game is perceived as too easy, with too little stimulation, players may become bored and lose interest. One participant commented, "What would help me stop playing earlier is

if it was just too easy. They just make the game easier." (P4). Another noted, "For me, offer nothing new. Don't hinder; make everything extremely easy." (P6)

Task accomplishment

Giving players a task to complete or giving them a sense of accomplishment was also reported to help players disengage. A participant retold, "Once I'm done doing the main quests or like daily quests, I just hop off" (P5). Two people mentioned this code in two instances.

User interface (DE)

An overly complicated or unfriendly user interface can make it harder to disengage. Players may find it frustrating if the game is challenging to navigate or if it requires too many steps to accomplish simple tasks. For example, one participant expressed, "You cannot instantly exit to desktop; you first have to exit to the main menu and then quit the game. So I would just add a button that makes you quit in some way" (P2). Simplifying the user interface can enhance the gaming experience by making it more accessible and less frustrating, making it easier for players to disengage. This potential support was noted by one person in one instance.

DE suppression

Table 6

Factors that suppress Disengagement (DE)

Code-group	Code	Description	Person count	Mention count
Suppression	Friends (DE)	Presence of friends	7	7

Friends (DE)

As seen in Table 6, friends were a factor found to suppress disengagement. Strong social ties within the game significantly suppress disengagement, as noted by seven people across seven instances. Participant 12 mentioned, "But it's also hard to disengage when you're with friends. Because it's just some people want to go out, some people don't, but you're with your friends, so you don't want to log off ". The presence of friends creates a compelling reason to stay online, as players do not want to miss out on shared experiences or feel left out of group activities.

Re-engagement (RE)

The last stage of engagement in the Process of Engagement model is Re-engagement. RE often happens periodically and can occur weeks, months or even years after disengagement. This phase is characterised by the return of the player. Identifying the triggers and time taken to re-engage can help games retain players, creating a larger player base and design a sustainable engagement cycle.

This part of the analysis is divided into two primary categories: triggers and the time required to re-engage. Triggers refer to the various dynamics that prompt a player to return to the game. Each trigger code represents a specific motivator that reignites a player's interest and compels them to re-engage with the game. Time to Re-engage encompasses the duration it takes for players to resume gameplay after disengagement. Understanding the time frame for re-engagement helps in designing strategies to maintain consistent player interest and activity.

RE triggers

Table 7

Factors that trigger Re-engagement (RE)

Code-group	Code	Description	Person count	Mention count
Triggers	Novelty (RE)	New in-game elements	10	10
	Friends (RE)	Invitations from friends or peer pressure to play Minecraft	8	10
	Game inspiration	Fresh ideas and new creative endeavours, such as projects	7	7
	Nostalgia	Returning to the game evoked fond memories, rekindling players' passion	4	6
	Progression (RE)	Improvement, achievement and desire to reach advanced stages of the game	4	6
	Continue task	The desire to continue unfinished tasks	2	2

Six factors that triggered re-engagement were identified, as listed in Table 7. The list of codes is organised in descending order of importance, where importance is measured by how

many different people mention each code and how often each code appears overall. Further details and representative quotes will be explored in the next section.

Novelty (RE)

Novelty remains a significant trigger, driven by new features, updates, or changes in the game. The introduction of new content, such as updates, new game modes, or features, provides fresh experiences that attract players back, as mentioned by ten people across ten instances. This novelty can break the monotony and renew players' interest in the game. Participant 7 mentioned, "Or if they release new features like they launch something new and interesting, and that's kind of a good excuse to go and test it out."

Friends (RE)

Friends are another powerful motivator for re-engagement, driven by social interactions, invitations, and peer pressure. Having friends playing Minecraft facilitates re-engagement, cited by eight people across ten instances. Playing with friends provides a shared experience that enhances the enjoyment of the game. The desire to spend time with friends or join them in multi-player sessions can prompt players to return. Additionally, peer pressure from friends who are actively engaged in the game can influence a player to re-engage. Participant 10 highlighted this by saying, "If a friend tells me to come online, I'll be more than happy to join."

Game inspiration

Getting inspiration for a new project prompts re-engagement, mentioned by seven people in 7 instances. Game inspiration involves players being motivated to re-engage with the game due to new ideas or projects that spark their interest. This trigger often includes creative projects, in-game challenges, or new strategies that players want to explore. The idea of starting something new or continuing a complex task can be very appealing, leading players to return to the game. For instance, Participant 3 mentioned, "If a new project comes to mind, I'm usually quick to hop on again," illustrating how a new creative idea can reignite engagement.

Nostalgia

A sense of nostalgia encourages re-engaging with Minecraft, cited by four people in six instances. Nostalgia involves players returning to the game to relive fond memories and past enjoyment. The game can evoke a sense of nostalgia, reminding players of their earlier experiences and enjoyment. This sentimental value can be a strong motivator for re-engagement

as players seek to reconnect with those positive memories. Participant 8 stated, "So it's kind of like visiting a part of your childhood kind of feel when I visit Minecraft now."

Progression (RE)

The desire for progression prompts re-engagement, noted by four people across six instances. The urge for progression drives players to return, particularly towards achieving late-game goals. Progression involves improving skills, acquiring better gear, or reaching new milestones. Players motivated by progression seek the satisfaction of achieving these goals and advancing in the game. Participant 7 illustrated this by saying, "I guess it's the progression. It's kind of when I start to get that spark back, and I want to play again. Then it feels like I want to get to that late game stage where we have everything, and everything is super easy."

Continue task

The desire to continue tasks can also motivate players to return to the game, as noted by two people in two instances. Players often leave tasks unfinished due to time constraints or loss of interest. However, the need to complete these tasks can pull them back into the game, driven by a sense of accomplishment or closure. Participant 4 expressed, "But day to day, it's just I want to continue where I left off," showing how ongoing projects can maintain a player's connection to the game.

Time to Re-engage

Table 8

Time to Re-engage (RE)

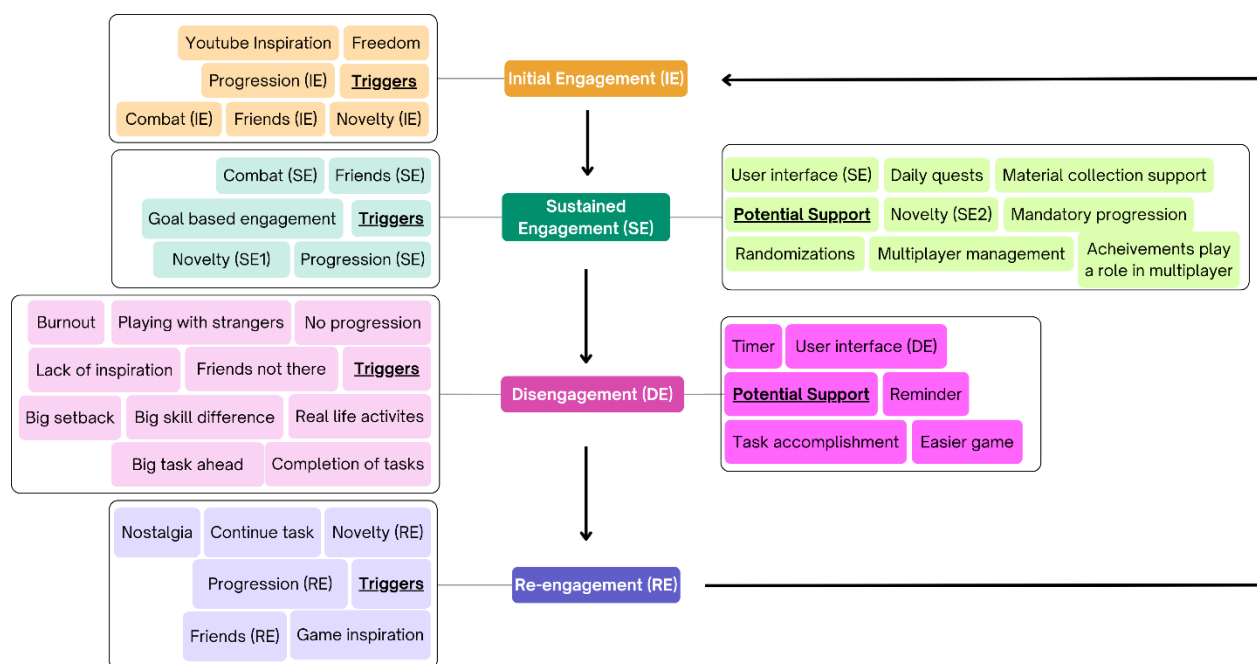
Code-group	Code	Description	Person count	Mention count
Time to re-engage	Days	Days to re-engage	5	6
	Week	Weeks to re-engage	3	3
	Months	Months to re-engage	10	10

As seen in Table 8, time to re-engage can be divided into three main categories: days, weeks and months. The time taken off is determined by how the player disengaged with the game or what the player did in the last session. Participant 4 shared, "If I'm on a consistent

streak, I'll play every day, but there could be months in between if I forget about the game or get bored." Another participant explained, "When I'm working on the projects, I can be on every day for, like, two weeks straight, maybe? Yeah, it depends on how big the project is. But if I stop after a few projects, it will usually take me until there's a new update to get into it. Again. So maybe months, it goes from days to months really" (P3).

Figure 1

Factors that trigger and potentially support engagement in Minecraft



From the findings above, a complete figure of all four stages of Engagement in Minecraft can be illustrated. Figure 1 shows a multitude of factors triggering Initial Engagement (IE) and Sustained Engagement (SE) in the sandbox game Minecraft, as well as contributors to Disengagement (DE) and Re-engagement (RE). Potential support for Sustained Engagement and Disengagement were also identified.

Discussion

Summary

This study aimed to explore the game dynamics that trigger engagement and disengagement in "Minecraft," utilising the Process of Engagement theory (O'Brien & Toms, 2008) and the MDA framework (Hunicke et al., 2004). The results provide valuable insights into

the factors that trigger and potentially support initial engagement, sustain engagement, lead to disengagement, and facilitate re-engagement in the context of Minecraft. The key triggers span various aspects, including social influences (friends), novelty, combat, progression, freedom, and external inspirations (e.g., YouTube). Sustaining engagement is heavily influenced by social interactions, goal-oriented gameplay, combat challenges, progression, and novel experiences. Disengagement appears to be driven by factors such as task completion, lack of social support, overwhelming tasks, burnout, lack of inspiration, setbacks, inability to progress, skill gaps, negative interactions, and real-life commitments. Re-engagement is prompted by new project ideas, social influences, unfinished tasks, novelty, nostalgia, and the desire for progression.

Theoretical Implications

The findings, when considered alongside existing theories and frameworks, present several significant theoretical implications for understanding player engagement in Minecraft and potentially other similar games.

The findings of this study align significantly with the Process model of Engagement (O'Brien & Toms, 2008), which conceptualises engagement as a dynamic, cyclical process rather than a static state. The study's recognition of disengagement as a potentially valuable component of the user journey, rather than a mere failure of design, aligns with the process model's cyclical nature, acknowledging that engagement is not a continuous state but a recurring process. This alignment not only validates the Process model of Engagement in the context of Minecraft but also extends its applicability to multi-player, sandbox-style gaming environments, providing a robust framework for understanding the complex dynamics of player engagement in such games. Two important factors that appeared in all stages were Friends and Novelty. The identification of Novelty in IE, SE and RE is in line with the Process model of Engagement (O'Brien & Toms, 2008). However, the Process model of Engagement did not identify the lack of Novelty (or Completion of tasks) as DE's attribute. Novelty, while acknowledged in the Process Model, manifests differently across the stages of engagement in Minecraft. In Initial Engagement, Novelty sparks curiosity and drives initial exploration of the game world. During Sustained Engagement, it keeps the experience fresh through new discoveries, challenges, or player-created content. In Re-engagement, Novelty often comes from game updates, new mods, or unexplored aspects of the game, rekindling interest and drawing players back. The findings reinforce the importance of Novelty but also provide a more nuanced understanding of how it operates at

different stages of engagement. Importantly, the research offers new insights into the Disengagement stage. The Process Model of Engagement (O'Brien & Toms, 2008) primarily describes Disengagement in terms of 'perceived time', 'challenge' or positive and negative effects. However, the study's findings suggest that Disengagement is actively driven by other specific elements, notably the perceived lack of Novelty or the Completion of major tasks. Additionally, the pervasive influence of Friends across all stages of engagement highlights a significant social dimension that the original Process Model of Engagement (O'Brien & Toms, 2008) does not explicitly emphasise. While the model focuses primarily on individual interactions with systems, this research underscores the crucial role of social connections throughout the engagement cycle in Minecraft. This suggests that engagement in multi-player games like Minecraft is not solely about individual experience but also about shared experiences and social interactions. Friends contribute to Initial Engagement by providing encouragement and guidance, sustain engagement through collaborative projects and shared adventures, mitigate disengagement by maintaining social bonds, and often catalyse re-engagement through invitations. The findings on the importance of friends and social interaction in engagement are in line with a study by Chen et al. (2006). The research stated the degree of player engagement is primarily influenced by social interaction, and for those who are highly engaged, social elements play a crucial role in shaping their gaming experience (Chen et al., 2006). However, the current study underlines that social factors could have both positive and negative influences. Not all invitations from friends leave a positive feeling; sometimes, the invites could produce peer pressure, making the player feel forced to start playing because the rest of the friend group is. Furthermore, this peer pressure makes it more difficult to leave the game while the whole friend group is still engaged. Social influence is a double-edged sword, and studies about engagement need to take into consideration that friends can have both positive and negative effects on the player. All in all, findings about social influence on engagement imply that engagement theories should consider not just individual-system interactions but also the social context in which these interactions occur. A more socially aware model of engagement could provide a richer understanding of how players interact with games and other interactive systems.

The findings of this study can be effectively contextualised within the MDA framework (Hunicke et al., 2004), a foundational theory in game design and analysis. The identified engagement triggers align with various components of the MDA model. Mechanics are

represented through Minecraft's open-world structure, combat system, resource gathering, and multi-player functionality. Dynamics emerge from the interaction between these mechanics and player behaviour, manifesting as progression systems, novelty and exploration, social interactions, goal-based engagement, and randomisations. The Aesthetics component is reflected in the emotional responses evoked by the game, such as the sense of freedom, challenge, discovery, and fellowship. Notably, the study's findings on disengagement factors also correspond to the MDA framework (Hunicke et al., 2004), with issues in user interface relating to mechanics, problematic progression and skill differences representing dynamics, and burnout suggesting a failure in maintaining desired aesthetics. However, the research also highlights potential areas for expanding the MDA theory. The influence of external factors like YouTube inspiration suggests a need to consider broader ecosystems in-game analysis. Furthermore, the cyclical nature of engagement, disengagement, and re-engagement processes implies that the traditional linear conception of MDA might benefit from refinement to accurately capture the complexity of player experiences. Additionally, the recognition of disengagement as a potentially positive aspect of gameplay challenges conventional applications of the MDA framework that primarily focus on sustaining engagement. These insights contribute to a more nuanced understanding of player experiences in modern, socially connected games like Minecraft and suggest avenues for potential expansions of the MDA theory.

Practical Implications

The findings of this study yield several practical implications for both Minecraft specifically and video games in general.

For Minecraft, the results suggest several avenues for enhancing player engagement while also encouraging positive disengagement. Firstly, given the importance of social interactions in driving engagement, developers should focus on enhancing in-game social features, facilitating easier connections with friends, and improving collaborative tools. Implementing a more structured progression system (e.g. Daily quests) while maintaining the game's sandbox nature could provide a sense of advancement for players seeking more directed gameplay. This aligns with the Snacking framework's (Alexandrovsky et al., 2019) concept of 'Mission Completion' – mission-based mechanics that give the player a sense of accomplishment. Secondly, regular introduction of new content, biomes, or gameplay mechanics could maintain the element of novelty that drives engagement. Novelty has been proven to be an

important dynamic and game mechanic in both the Process model of Engagement (O'Brien & Toms, 2008) and the Snacking framework (Alexandrovsky et al., 2019), therefore adding new in-game elements would combat boredom (Berlyne, 1970) and lengthen the period of engagement for players. Thirdly, refining the combat system to ensure it remains challenging yet accessible could further support engagement, as combat was identified as a key trigger. Fourthly, implementing in-game tools for setting and tracking personal or group goals could support goal-based engagement (Law & Jacob, 2013). In addition, several recommendations can be made regarding positive disengagement - disengagement from tasks to build energy capacity that provides more opportunities for meaningful engagement (Constantino, 2016). Providing natural stopping points, in line with the Snacking framework (Alexandrovsky et al., 2019), 'Blocking' and 'Waiting' mechanics can mitigate burnout and promote healthier engagement patterns. Blocking mechanics prevent the player from accessing the required elements needed for gameplay (Alexandrovsky et al., 2019). Explicit blocking can prevent overplay, burnout, or lack of interest in a game; even if many players complain about this limiter, the objective behind blocking through regeneration mechanics is to limit the duration of a gameplay session (Joel, 2015). Waiting mechanics are features in games that take time to complete, including resources that must be collected gradually or produced via instructions (Alexandrovsky et al., 2019). Waiting can help combat burnout and excessive gameplay and has even been found to be utilised to promote delayed gratification in order to keep gamers mentally engaged (Carducci, 2009). Finally, to promote positive disengagement, reminders or timers set by either the game system or the players themselves could facilitate smoother transitions between engagement and disengagement, preventing abrupt interruptions or frustrations. The game can remind the player how long they've been playing to raise awareness, and if the player doesn't want to be reminded, they can set a timer or countdown to help them disengage.

For video games in general, the implications of this study suggest a need for more intentional design around engagement and disengagement cycles. Implementing the Snacking framework more broadly could involve introducing natural stopping points or "cool-down" periods in gameplay to prevent burnout and time-gated content or daily quests that provide reasons for players to take breaks and return later (Alexandrovsky et al., 2019). These strategies promote a more balanced engagement cycle. To encourage positive disengagement, games could incorporate reflection prompts after extended play sessions, offer suggestions for offline

activities related to the game's themes, and provide end-of-session summaries highlighting accomplishments. These features can help players feel satisfied with their progress and comfortable taking breaks. Re-engagement techniques could include personalised notifications about new content aligned with individual interests and features that facilitate reconnection with in-game friends upon return. Addressing the "big skill difference" disengagement factor through sophisticated matchmaking systems in multi-player games could enhance player retention (Horton et al., 2016). Furthermore, prioritising intuitive UI design, implementing flexible progression systems that accommodate various play styles and time commitments, and fostering positive community building could all contribute to a more engaging and balanced gaming experience.

By incorporating these recommendations, which are grounded in the study's findings and the principles of the Snacking framework by Alexandrovsky et al. (2019), game developers can create experiences that not only attract and retain players but also promote healthy gaming habits and positive disengagement. This approach aims to enhance the overall player experience while acknowledging the importance of both engagement and intentional disengagement in the gaming lifecycle, potentially leading to more sustainable and enjoyable gaming practices.

Limitations

While this study provides valuable insights into engagement dynamics in Minecraft, several limitations that may impact the interpretation and generalizability of the findings must be acknowledged.

A significant limitation of this study is the small number of participants. Although the study focuses specifically on participants who play Minecraft's multi-player mode, the limited sample size raises concerns about the representativeness of the findings. The small participant pool may not adequately capture the diverse experiences and perspectives of the broader Minecraft player base, potentially missing important nuances or variations in engagement patterns. This limitation restricts our ability to generalise the results beyond the specific group studied, as the experiences of this sample may not reflect those of the wider Minecraft community or players of other sandbox games.

Furthermore, the absence of objective measures or corroborating data sources poses another substantial limitation. The study relies primarily on self-reported experiences, which, while valuable, are subject to various biases and limitations. Participants' recall of their gaming

experiences may be incomplete or influenced by recency effects, where more recent experiences are given more weight, or social desirability bias, where participants may report what they believe the researchers want to hear. Additionally, participants may struggle to articulate complex emotional or cognitive processes accurately, potentially leading to oversimplification or misrepresentation of their engagement experiences. The lack of objective data, such as actual gameplay metrics (e.g., play session duration, frequency of social interactions, or in-game achievements), means that the study cannot triangulate the self-reported data with more objective measures. This triangulation could have provided a more comprehensive and accurate picture of engagement dynamics.

These limitations underscore the need for future research incorporating larger, more diverse samples and employing mixed-method approaches combining self-reports with objective data. Such efforts would help validate and extend this study's findings, providing a more comprehensive understanding of engagement and disengagement processes in digital gaming environments.

Future Work

Based on the findings and their implications, several recommendations can be made for future research and game design endeavours. First, exploring the applicability of the identified factors and dynamics in other game genres and contexts, both single-player and multi-player, would broaden the understanding of engagement dynamics across various gaming experiences and inform the development of tailored strategies for different game types. Second, investigating the effectiveness of implementing "snacking" dynamics, such as blocking or waiting mechanics, in mitigating burnout and promoting sustainable engagement patterns would be beneficial; empirical studies could validate the impact of these dynamics on player experiences and inform best practices for their implementation. Finally, collaborating with game developers and designers to translate the research findings into practical guidelines and design frameworks could foster a more effective integration of engagement-enhancing strategies into the game development process, ultimately leading to more immersive and captivating gaming experiences. By addressing these recommendations, researchers and game designers can refine our understanding of engagement dynamics, validate and extend existing theoretical frameworks, and develop more engaging, immersive, and sustainable gaming experiences tailored to diverse player preferences and contexts.

Conclusion

This study sought to investigate the factors that trigger engagement and disengagement in Minecraft multi-player mode. The findings reveal a complex interplay of social and game-related factors that shape the engagement experience. While social interactions, particularly with friends, emerged as a pervasive driver of initial engagement, sustained engagement, and re-engagement, other factors such as novelty, progression, goal-oriented gameplay, and combat challenges also played significant roles. Conversely, disengagement was triggered by task completion, lack of social support, burnout, setbacks, inability to progress, skill gaps, negative interactions, and real-life commitments.

This study has made significant strides in understanding the intricate interplay of factors that shape engagement and disengagement dynamics in Minecraft multi-player. By embracing disengagement as an integral part of the user experience rather than dismissing it as a failure or undesirable outcome, researchers and designers can unlock new frontiers in creating engaging, ethical, and sustainable gaming experiences. The findings and recommendations from this research have the potential to reshape the gaming industry, promoting player wellbeing, autonomy, and a deeper appreciation for the nuances of human-computer interactions. As digital experiences continue to evolve, this holistic approach to understanding engagement and disengagement dynamics will become increasingly vital in fostering meaningful, balanced, and self-regulated user experiences that resonate with diverse communities and contribute to overall wellbeing.

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Appendix 1

What does your typical Minecraft session look like?

How do you usually get engaged in a game session?

What about the game sustains your engagement?

How do you usually get disengaged in a game session?

What gets you to re-engage with Minecraft?

How long does it take you to re-engage with the game?

What helps you exit/disengage from Minecraft?

If you could add something to the game to help you exit a session easier, what would you add?

If you could add something to the game to make it more engaging, what would you add?

How does playing in multi-player affect your engagement and disengagement?

Appendix 2

Which gender do you identify with?

What age are you (in years)?

What is your nationality?

Do you have something to add to the interview regarding game content and engagement?

Do you have something to add to the interview regarding game content and disengagement?

Do you have something to include in the question, 'If you could add something to the game to help you exit a session easier, what would you add?'

Do you have something to include in the question 'If you could add something to the game to help you be more engaged, what would you add?'

Do you have anything to add to the study?