DESIGNING A MINIMALIST UI FOR IMMERSIVE GAMEPLAY

GDEV60001 GAMES DEVELOPMENT PROJECT

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Contents

Glossary

UI – User Interface

UX – User Experience

UE5 – Unreal Engine 5

RPG – Role Playing Game

HUD – Heads-Up Display

Abstract

In modern-day games, using complex user interfaces (UIs) to display large amounts of information has become increasingly more common. UIs of this nature can cause a multitude of issues for user experience (UX), such as cognitive overload and a reduction in player immersion. This study investigates how minimalist design can improve player immersion by lowering the player's visual clutter and distractions. The research conducted in this paper focuses on how established UI and UX theories, concepts, and principles, such as Fitts's Law, Hick's Law, and the Gestalt Principles of Perception, can guide the development of effective minimalist interfaces in video games. In order to determine the best practices for designing user-friendly and engaging interfaces, a thorough literature review on UI/UX was carried out.

Furthermore, a review of existing game UIs was also conducted in order to understand common design flaws, pitfalls, and effective techniques that are frequent in popular video game titles. Based on the research conducted in the study's literature review, two minimalist UI interfaces were created in Unreal Engine 5's (UE5) UMG system. The effectiveness of these iterative designs was then assessed using qualitative user perception testing, in which participants evaluated the two UI versions' clarity, usability, and ability to provide an immersive experience, with the second UI version being developed based on the feedback and suggestions gathered from the survey results. The overall findings in this study revealed that the second UI iteration was seen as more effective for enhancing player immersion, reducing cognitive load, and improving clarity. Participants stated that adjustments such as clearer visual hierarchy, improved feedback mechanisms, and the removal of unnecessary elements resulted in a more intuitive experience overall. These results align with established UI and UX theories, which support the effectiveness of minimalistic design in improving user engagement and immersion in video games.

1. Introduction

In the current video game industry, user interface (UI) design and user experience (UX) are crucial factors in determining a player's immersion in a game. Effective and minimal UI design aims to present all necessary information to a player clearly and intuitively, whilst UX focuses on ensuring a player has an enjoyable and seamless interaction with a game. Brown and Cairns (2004) state, "The experience of immersion is often critical to game enjoyment", showing how important it is for UI and UX to allow for an immersive experience. Therefore, designing a minimalist UI that focuses on immersive gameplay is a relevant and important topic in modern gaming.

The issue that many modern-day games face is an overload of non-essential information being displayed on screen. Furthermore, when paired with poorly designed UI that prioritises the amount of information displayed rather than how it is displayed and the UX principles behind it, it can result in a cluttered UI that takes immersion away and distracts players from the gameplay. For example, games such as *World of Warcraft,* which display a large amount of information on the screen at once, can cause a user to get distracted from the core gameplay, leading them to become 'lost' in menus and data. On the other hand, minimalist UI seeks to reduce this visual clutter and replace it with purely essential elements. This allows players to be immersed in gameplay without distractions, as true immersion requires that users "forget they are participating through a medium", which can be achieved by using minimalist UI that is "invisible or at least unnoticed by the player" (Federoff, M. 2002).

This study aims to investigate how minimalist UI and UX principles can create an immersive gameplay experience across multiple genres for PC and Console games. This will be completed by examining key UI design theories and principles such as Hicks' Law, Fitts' Law, and the Gestalt Principles of Perception as well as analysing existing game UIs in order to work out which practices should and should not be used. Using this research, this project then aims to identify design strategies that can be applied to a minimalist UI which supports

immersive gameplay. With Minimalist UI only presenting the essential information on the screen, it has the potential to give a fully immersive experience, allowing players to 'get lost' in a game environment, resulting in an increase in their enjoyment.

To further explore this area, two UI versions will be created, user tested, and iterated upon in order to understand the impact these principles and theories have on player immersion. User feedback from surveys will provide insight into how the interfaces should be iterated. The questions in this survey will focus on how easy the UIs are to understand, how distracting they are, and the organisation of the data and information to be displayed. By focusing on simplicity and clarity, this project aims to develop a UI that enhances gameplay by removing unnecessary clutter and distractions, allowing for a more immersive gameplay experience.

2. Aims and Objectives

This study aims to investigate how minimalist UI design can enhance immersive gameplay experiences by reducing visual clutter and cognitive load while ensuring that usability is maintained. The study explores how UI design principles and user immersion are related, highlighting the essential elements of a successful minimalist user interface in video games. Through user testing, iterative design, and theoretical analysis, this study aims to discover how minimalism can improve usability and engagement without sacrificing essential game information.

The objectives of this study are as follows:

- To examine existing literature and established UI/UX theories, including Fitts's Law, Hick's Law, and Gestalt Principles of Perception, to understand their implications in minimalist UI design for video games.
- To analyse UI designs in existing games, identifying effective minimalist design strategies and commend issues in clutter interfaces.
- To develop and implement two UI iterations using Unreal Engine 5's UMG system, applying minimalist design principles to ensure an immersive gaming experience.
- To conduct qualitative user perception testing through surveys to evaluate the UI prototypes' clarity, usability, and immersive qualities.
- To iteratively refine the UI versions based on user feedback, improving visual hierarchy, feedback mechanisms, and usability while maintaining a minimalist approach.
- To compare and evaluate both UI iterations against established design theories and principles, determining their effectiveness in enhancing immersive gameplay.

By achieving these objectives, this study aims to contribute to the field of game UI design by providing insights into the effectiveness of minimalist UI principles in improving player immersion and usability.

3. Literature Review

3.1 Introduction to UI and UX in Video Games

User interfaces (UI) in games describe the visual and interactive elements that allow players to interact with a game world. Kristiadi et al. (2017) describe UI as anything designed to provide information to a user with which they can interact. This can include on-screen displays such as a health bar, inventory, or a games menu, whilst it can also describe any other displays or controls that provide information to the player or allow for gameplay interactions. On the other hand, User Experience (UX) in games refers to the overall feel of the interaction between a player and a game. The previously mentioned study also refers to UX as "the art of a product design planning" in which a user's interaction with those products will be as significant as possible. This describes how UX can create an enjoyable, seamless, and immersive gameplay experience by being well-designed.

In this study, the focus of UI will be on-screen displays, menus, and widgets. These displays, such as the previously mentioned health bars and inventory screens, are essential to providing a user with important information about what is happening in the game world. Without these, there would be a massive gap in understanding between the game's environment and how a player can interact with it. According to Fagerholt and Lorentzon (2009), UI elements—particularly non-diegetic UI elements—are "particularly suitable for conveying information with a high level of detail" to the user. Information that is not related to the game's plot is presented by non-diegetic user interface elements. These elements would be the typical UI elements that a user would see but that an in-game character/avatar would not be aware of. These elements could include health, ammo, or experience bars. The role of good UX in games is also vital in determining how users perceive a game. A bad UX can have several adverse effects on a game and harm a player's overall enjoyment, possibly causing them to want to stop playing.

Good UX practice is important not only for games but also for companies, businesses, websites, and anything that deals with customers. Kantamneni (2022) states that for companies to do well, they must "create the best user experience" for all users who are participating in their "business ecosystem". By providing a quality UX experience, businesses would have a greater chance of keeping customers by ensuring they are engaged and, as a result, interested. This logic can also be considered when creating a game. By the same measure, providing a good UX for a game's player base can keep the players engaged, interested, and immersed.

The concept of a minimalist UI in gaming is to present only the essential information needed for gameplay in a clear, unobtrusive manner. A minimalist approach to UI aims to reduce visual clutter and cognitive load, allowing players to remain fully immersed in the game world without being distracted by unnecessary on-screen elements. At a basic level, a minimalistic UI removes all "unnecessary components, leaving only the parts one really needs" (Nealen et al., 2011). Minimalist UI design typically uses clean lines, subtle animations, and limited colours to convey data such as the previously mentioned health or inventory components. Furthermore, minimalist UI prioritises clarity and ease of understanding over detailed or flashy visuals.

3.2 The Importance of Immersion and How It Is Achieved

To understand how a minimalist design can improve a player's immersion in a game, it is essential first to understand what player immersion is and why it is important to a game. Immersion in games describes the experience of a player becoming deeply engaged in a virtual world. The main idea of immersion is that the player can start to feel like they are a part of the game's world rather than just being on the outside, controlling and observing it. It involves players losing awareness of the real world and becoming fully absorbed in a game's story, environment and even characters. The importance of immersion in games also cannot be understated. Weibel and Wissmath (2011) state that data conducted from a broad survey by Yee (2007) shows that a large proportion of users play games because they like to be

"immersed in a fantasy world", suggesting that people seek games that will provide them with an immersive experience. Therefore, if a game were not to provide an immersive experience, it could negatively impact that game. Complete immersion in a game can sometimes have real-world health benefits for the players. One study believes that players may get immersed in games to experience some form of escapism, allowing them "to avoid thinking about real-life problems" (Yee, 2007). This again highlights that immersion is an essential part of creating a good gaming experience.

Although immersion is important in games, we must also discuss how immersion can be achieved. Immersion is often achieved through realistic or compelling visuals and audio, intuitive gameplay mechanics, and well-designed UI. Combining these together creates a seamless and cohesive gaming experience, allowing a player to become fully immersed in a game's world. These elements are also designed to draw players into the virtual world and reduce their awareness of the real world. The study's primary objective focuses on creating a well-designed, unobtrusive, and contextual minimalist UI to maximise a player's immersive experience.

3.3 Minimalist Design and How It Can Enhance Immersion

Minimalist design focuses on simplicity and clarity to provide an immersive experience. A minimalist UI design eliminates unnecessary clutter by using only essential UI elements and displaying them clearly and simply, leading to a clean, visually appealing experience. Some key principles of a minimalist UI include using negative (or white) space, focusing on essential elements, using a limited colour palette, and using simplistic and straightforward UI widgets, buttons, and icons. Negative space, the empty or clean space between and around UI elements, is an "essential component" of minimalist UI. It can improve "readability and usability" and produce an aesthetically pleasing outcome. (Lashin and Helmy, 2021). In terms of 'essential UI elements', determining what is and is not classed as essential can vary between projects, genres, platforms, and target audiences. Some elements, such as health bars, inventories, objective indicators, and interaction prompts, commonly fit the category of

essential elements across gaming. Whereas UI components, such as lore and background information, decorative widgets, or even excessive pop-ups, may all fit the category of non-essential UI elements and, therefore, would not need to be displayed in a minimalist UI. Meyer (2015) describes minimalist UI as one where all the UI elements "could be soundly argued to be necessary", highlighting this principle of essentially 'purging' the unnecessary elements. However, as previously mentioned, determining what elements are and are not necessary comes down to the project's goal.

Minimalist design is the perfect choice to enhance a player's immersion, as its end goal is to display content in a "naked, clean, and intuitive way" while providing as little distraction from the game's content as possible (Meyer, 2015). This shows that minimalist design and improving players' immersion come hand in hand, as by having a game content, story, and environment displayed in a way that is as clear and unobstructed as possible, a player can get fully immersed in the gaming experience. Additionally, a minimalist UI design reduces cognitive load for players by allowing them to focus on only essential on-screen elements without any unnecessary visual clutter. This means players can quickly process information without becoming overwhelmed, allowing them to engage more with the gameplay itself. By decreasing a player's cognitive effort, a minimalist UI ensures players can stay focused, further enhancing their gameplay ability and ultimately leading to a more enjoyable and immersive experience.

3.4 Key UI Design Concepts

During the development phase of a user interface, there are various key design ideas and concepts to follow that are crucial aspects of creating something intuitive and immersive. There are many well-established concepts when it comes to UI, such as maintaining a clear visual hierarchy and keeping a uniform or consistent look throughout, as well as multiple others. By following these concepts, a designer will be able to create a good design that serves us "without drawing attention to itself" (Norman, 2013). This idea of having an "invisible" UI aligns perfectly with the principles of a minimalist UI by being unnoticeable and unobtrusive,

allowing for complete immersion in a game's environment without being distracted by an overload of information (Norman, 2013).

Consistency is the first and most significant UI design element that will be examined in this study. Consistency is the idea of preserving uniformity throughout a project. According to Lidwell et al. (2010), maintaining a clear and consistent structure throughout a design enables people to "efficiently transfer knowledge to new contexts", thus allowing them to focus on the "relevant aspects of a task". Maintaining consistency not only relates to the idea of keeping a similar style and appearance but also keeping similar functionality across the different elements. This ensures that users can predict how the interface will behave, reducing the need to relearn or guess each new interaction and allowing more focus on the gameplay environment rather than the UI. The next concept, also dubbed one of the most important, uses a clear and compelling visual hierarchy. Visual hierarchy mainly refers to the arrangement of different UI elements so that they can clearly convey their importance relative to each other. The idea is to create a design where the "more important" elements and information are "more prominent" and visually organise it so that users can easily understand those elements and their relations to one another (Krug, 2014). By doing this, a designer is able to create a UI that has a much lesser impact on a user's cognitive load by ensuring that the amount of thinking they would have to do is minimised. Another important concept is the idea of providing a user with some form of feedback during every interaction they have with an interface. This could be visual feedback like an animation or colour change or audio feedback like a clicking noise when pressing a button. According to Norman (2013), feedback is an essential part of the design. If it is missing or done wrong, "people often give up, going off to do other activities". Providing feedback correctly is striking a balance between providing the appropriate amount of feedback and ensuring it is delivered immediately and without delay. Getting feedback right can be a complex challenge as "poor feedback can be worse than no feedback at all" as it can be distracting, uninformative and sometimes "anxiety-provoking", whilst too much feedback can be "more annoying than too little" (Norman, 2013). However, if feedback is done correctly

and seamlessly, it could significantly improve a user's experience by providing them more enjoyment and sometimes a sense of being rewarded whilst also being natural and unnoticeable.

3.5 Important Theories Relevant to Minimalist UI

3.5.1 Fitt's Law

There are three main game design theories relevant to minimalist UI that this project aims to explore. The first theory this study will investigate is 'Fitt's Law'. This theory describes the relationship between the time required to move to a target and the distance to and size of the target, asserting that movements to larger and closer targets can be executed more quickly (Fitts, 1954). This essentially states that larger targets are easier and faster to interact with, whilst closer targets require less movement time. Therefore, this means that targets are more challenging to interact with when they are small or distant. This is relevant to UI as it shows that as a target's size decreases, such as a button or a widget, the "time taken to select that target increases" (McGuffin, 2002). This emphasises the importance of designing UI elements to be easily accessible and large enough to interact with them efficiently. This Law strongly supports minimalist design as it advocates for less complex UI, with fewer carefully and intentionally sized and placed elements. By applying this Law during the creation of a UI, many of the previously mentioned minimalist UI principles can be implemented or improved. For example, by having smoother and effortless interactions between a user and a game's UI elements, they can focus more on the gameplay itself, improving immersion and reducing cognitive load.

Furthermore, by making more critical buttons such as heal, attack, or interact larger, more precise, and closer to a user's medium of interaction, a user could respond much quicker. This can be crucial for a user during critical moments in a game and can reduce their likelihood of becoming frustrated at the game, in turn improving their user experience. This logic is not only relevant to buttons within a UI but also to key binds and controls. Important controls such as

the previously mentioned healing or attacking controls are not always accessible with a button; instead, they may be interacted with using another device like a keyboard or controller. In that case, the logic of this theory can still be applied, and crucial controls should be placed nearer to where a user's hands are by default. For example, a game that uses 'WASD' as its movement controls may put one of those important interactions at 'F', 'Q' or 'E', as they sit close to where a user's fingers may naturally be. A UI can then represent these controls in multiple ways, such as by showing the correct key on the screen or by displaying a corresponding UI widget for the interaction with an animation to make it evident that it has been pressed. Overall, Fitt's Law is a key game design theory that must be understood and made aware of when creating a minimalist UI.

3.5.2 Hick's Law

Another important theory relevant to minimalist UI is Hick's Law. Hicks (1952) states that the "rate of gain of information is, on the average, constant with respect to time". At a base level, Hick's Law states that the more choices there are to make, the longer it takes to make a decision. Therefore, according to this logic, a minimalist interface, with fewer on-screen options and interactive elements, would improve the usability of the UI itself and result in a more positive user experience. As this Law allows players to make decisions quickly without having to sift through large amounts of information, a user's immersion can also be improved as their focus remains on the gameplay.

Furthermore, once again, Hick's Law helps to reduce a user's cognitive load by reducing the amount of mental effort that a user must undergo when making multiple decisions. This aligns directly with the principles of minimalist UI that prioritise simplicity, clarity, and efficiency. By designing interfaces with fewer but more relevant options, players can enjoy a more immersive gaming experience while avoiding frustration or becoming overwhelmed. By understanding this Law, UI designers can "improve the efficiency of a design", as fewer choices enable users to navigate a UI more efficiently, enhancing both usability and engagement (Lidwell et al., 2010).

3.5.3 Gestalt Principles of Perception

The final theory this study will focus on is the Gestalt Theory and its principles of perception. This theory states that in some contexts, meaning or elements of a whole object cannot always be "deduced from the characteristics of the separate pieces." (Wertheimer and Riezler, 1944). In the context of a UI, this theory essentially describes how users are more likely to naturally perceive elements as grouped or related, when possible, rather than as smaller, separate parts. Gestalt Theory contains six main principles: proximity, similarity, common fate, continuity, closure, and figure-ground relationship. By following these principles and understanding their relevance to a minimalist UI, a designer can create a UI that is visually organised, intuitive, and easy to navigate. These principles ensure that UI elements are grouped effectively, reducing cognitive load and, in turn, allowing players to focus more on the gameplay, enhancing immersion and user experience.

Each of these principles is important and relevant to designing a minimalist UI as they lay out a key guideline of rules that should be followed to create a mentally pleasing and immersive UI. The rule of proximity states that elements or objects that are close together are naturally perceived as a group and are more closely related than elements that are further apart. Similarly, the principle of similarity states that similar elements or objects are also perceived as related and grouped compared to dissimilar elements. These principles are both relevant to minimalist UI design as they can lead to a reduction in the cognitive load of a user due to the fact that the grouping resulted from both proximity and similarity reduces "the complexity of designs and reinforces the relatedness of the elements" (Lidwell et al., 2010). As a reduction of UI, complexity and clutter are two of the main factors in having a minimalist UI, and these principles hold a strong link to the foundation of minimalist UI creation. The principle of common fate, also referred to as 'the factor of uniform density', states that elements moving in the same direction can also be grouped and related. For example, a shift of an entire group of naturally related elements could be described as "pro-structural", which could use common fate and another principle, such as proximity to group the elements.

In contrast, a shift of unrelated elements could be described as "contra-structural", with these elements purely related by common fate (Ellis, 1938). This principle is also relevant to a minimalist UI as it best describes how UI elements should move, possibly through animation, based on their relation to one another. The Law of Continuity refers to the tendency to perceive a line of objects or elements as grouped or related. By following this principle, a user can follow a line of elements, objects or widgets smoothly and efficiently without diverting their attention. This allows users to easily navigate the interface without confusing or overwhelming them, allowing for a steady state of immersion. The final two gestalt principles of perception are closure and figure-ground relationship. According to the principle of closure, individuals perceive a set of individual elements as a group with a distinguishable pattern rather than multiple individual elements. The principle of figure-ground relationships states that the mind separates items from their backdrop to focus on specific elements, with the 'figure' representing the object or element and the 'ground' representing the background. By applying these principles to a minimalist UI, users can better understand the information being displayed on-screen, allowing for an increase in focus and, therefore, an increase in immersion. Closure can allow designers to "reduce complexity" in a UI whilst maintaining a stable figure-ground relationship and can "increase the probability of recall" for certain key UI elements (Lidwell et al., 2010). Whilst these are the six main Gestalt principles of perception, other principles such as the 'Law of Pragnanz' or 'Uniform Connectedness' are also often referred to as relevant principles. The Law of Pragnanz states that a user may interpret a set of ambiguous elements in the simplest possible way, highlighting that if a set of elements starts simple, it would require "fewer cognitive recourses" than a set of complex elements (Lidwell et al., 2010). Moreover, the principle of uniform connectedness states that elements connected by visual properties such as colour, shape and size tend to be grouped and related compared to objects without similar visual properties. This principle is similar to proximity and similarity and remains relevant in the same ways.

Overall, there are many ways in which the Gestalt Theory and its principles of perception are relevant to a minimalist design. By following these key principles, a designer can create a UI that maintains a user's focus and attention while reducing their cognitive load and the chance of them becoming overwhelmed. These are all important factors in determining what can create an immersive gaming experience. This is due to how the Gestalt principles simplify and organise how the information is presented, resulting in a much more straightforward UI and structure. Essentially, this theory proves itself an important theory to consider when creating a minimalist UI as it can guide designers to create interfaces that align with how a user may naturally perceive visual information.

3.6 Cluttered UI and How It Impacts User Experience

A cluttered UI is usually characterised by an excessive amount of information with a poorly organised layout that can significantly hinder a player's ability to enjoy and immerse themselves in a game. There are many reasons to want to create a clean and simple minimalistic UI over a poorly designed UI that is cluttered and overloaded with non-essential information. One of the main reasons could be that a UI like this can result in many adverse effects on the user experience of a player. These adverse effects can range from outcomes of a more extreme nature, such as ones that result in a user leaving, quitting or uninstalling a game entirely, or more minor outcomes, such as ones that cause frustration, annoyance, or disengagement with the gameplay itself. This is especially relevant when considering that a game UI that is "easy, practical and efficient to use" can have positive effects on the game itself, such as an increase in "the loyalty of its users" or even player satisfaction and retention by providing a more enjoyable user experience (Liu et al., 2020). Therefore, no matter how small or large these effects are, all adverse effects on a player's UX should be avoided or at least mitigated, as a poor or cluttered UI can overwhelm users with too much information, making it difficult for them to focus on the gameplay, ultimately decreasing their enjoyment and immersion. Some of the adverse effects users may experience when facing a cluttered UI are a loss of immersion, visual fatigue, and even cognitive overload, which can all lead to a loss

of connection between a user and a game world, resulting in a loss of immersion and potentially ruining their gameplay experience.

One of the main consequences of a cluttered UI is a user feeling cognitive overload. Cognitive overload is when the amount of information or mental demands on a user exceeds their cognitive capacity. This means that their brain may be unable to correctly process all the information they are receiving, leading to a loss of focus and possibly increased stress and frustration. This unnecessary stress and loss of focus can then cause impairment to a user's decision-making skills, ultimately harming their ability to play the game well, therefore reducing their immersion.

This study will now discuss about three examples of cluttered UI in games.

3.6.1 No Man's Sky

The first example is No Man's Sky, which was developed by Hello Games and released in 2016. One of *No Man's Sky's* most significant UI flaws is its inefficient use of screen space, particularly in base-building mode. While menus and command lists are essential, *No Man's Sky* permanently dedicates around 28% of a 1920x1080 screen to UI elements, leaving players with only a quarter of the screen to place and arrange structures. This is depicted in Figure 1 below. Poor layout decisions further restrict this limited area, causing the main building space to be pushed to the top-left corner. Meanwhile, floating info panels and object component menus are positioned in the right and lower sections of the screen. This layout forces players to operate in a constrained space, which makes accurate placement more challenging and lessens the sense of immersion (Lins, 2023).

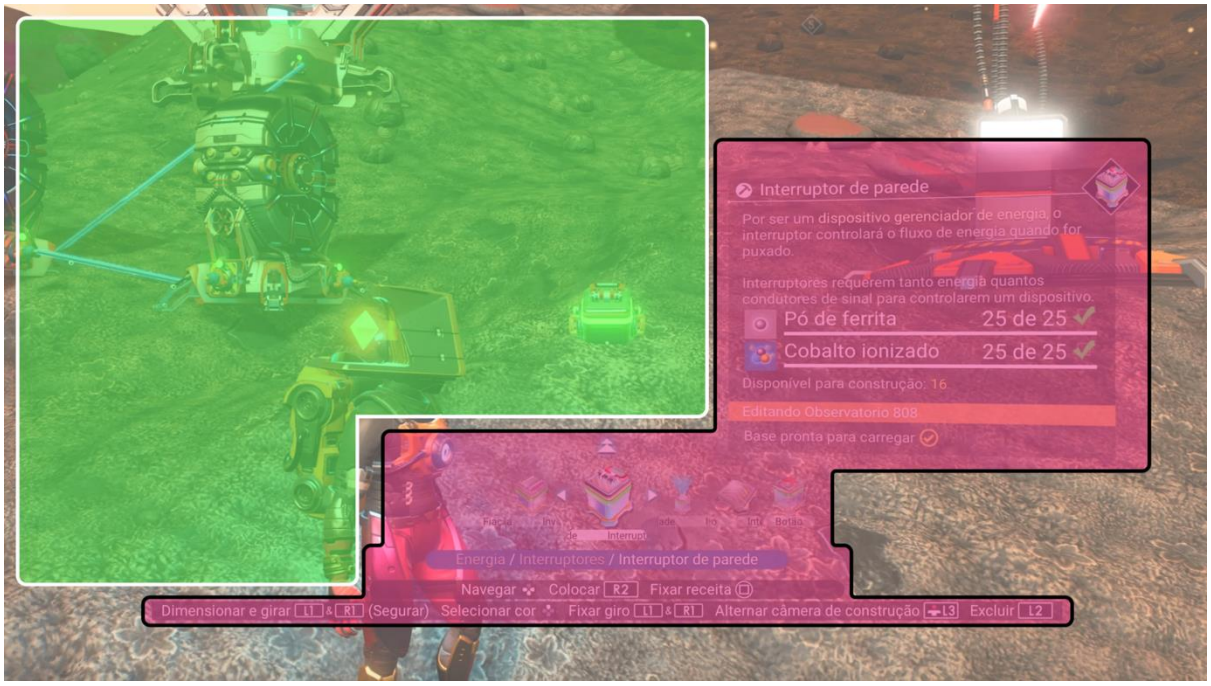

Figure 1: No Man's Sky overcrowded UI

Aside from base-building, the overall UI in *No Man's Sky* has long been criticised for being cluttered and unintuitive. Menus, inventory screens, and crafting systems are filled with excessive text, icons, and convoluted options, making navigation overwhelming (Broms, 2021). The absence of clear organisation compels players to search numerous widgets to perform simple tasks, disrupting the flow of play. In addition, critical information is often persistently displayed instead of contextually, leading to visual clutter that diverts attention from exploration and interaction (Liu et al., 2020).

Recognising these issues, Hello Games tried improving UI clarity in later updates, including *Frontiers*. The game's UI shows how poor spatial organisation and excessive on-screen elements can hinder an otherwise immersive experience (Lins, 2023).

3.6.2 Starfield

Bethesda Game Studios' 2023 game Starfield provides the second example. Many users believe that Starfield's user interface is cluttered and ineffective, making simple tasks more difficult than they need to be. Its poor use of screen space is a common issue, as menus

prioritise huge item graphics above useful inventory details, making it difficult for players to quickly find information and causing them to search through unimportant visual elements (Quintal, 2023). Because of the excessive clutter in this design, simple tasks such as inventory management become difficult and counterintuitive. Due to the game's uneven menus, many players have also reported an annoying and disjointed experience when playing the game.

While the game's compact HUD was generally well-received, the broader UI failed to modernise where it was most needed. Fans voiced concerns about these issues even before launch, and criticism continued post-release, with many arguing that Bethesda did not adapt its interface to meet modern usability standards (Yin-Poole, 2023). As a result, the modding community quickly stepped in to fix the problems. StarUI Inventory became one of the most downloaded mods, highlighting the widespread demand for a more straightforward, more functional UI. Ultimately, Starfield's menu system trades efficiency for aesthetics, overwhelming players with cluttered design choices that hinder usability and immersion.

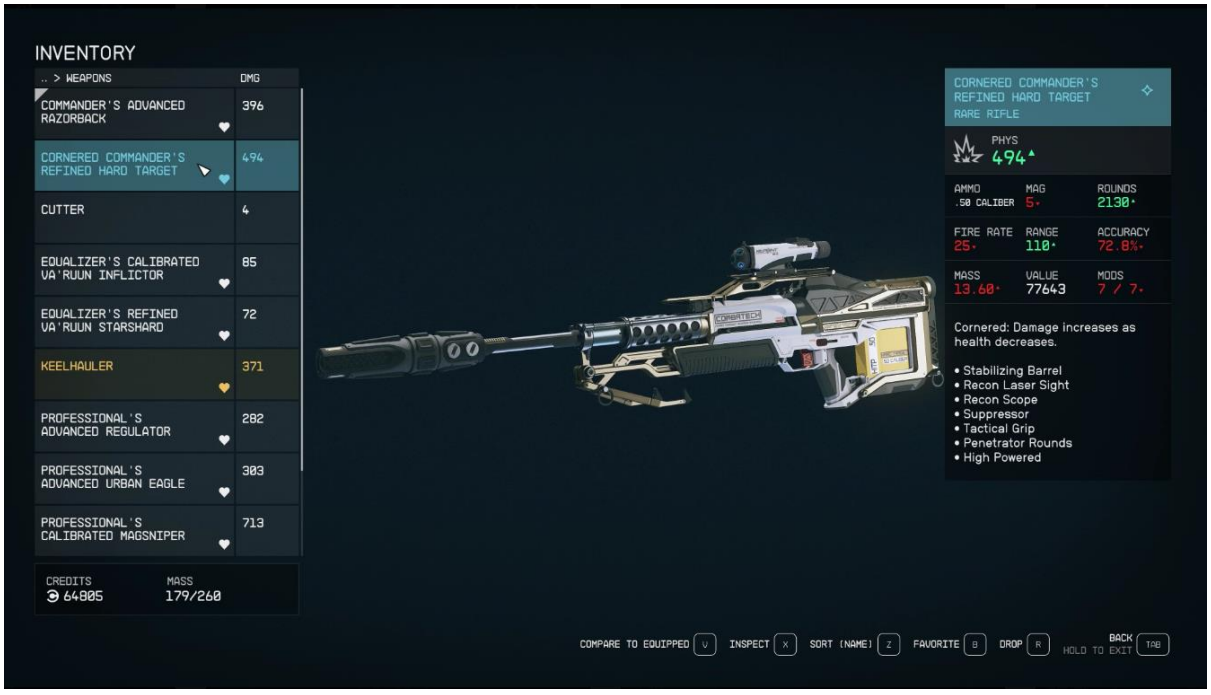

Figure 2: Starfield Cluttered UI

3.7 Examples of Effective Minimalist UI/UX in Popular Games

3.7.1 The Last of Us Part II

The simple user interface of The Last of Us Part II was intentionally designed to increase immersion while removing unnecessary distractions (Girardelli, 2021). This idea means players can become completely absorbed in the story and action thanks to its discrete and unobtrusive HUD, which only shows vital information like health, equipped weapons, and ammo. In order to provide convenient access without interfering with gameplay, crucial UI elements are always displayed in the same corner of the screen. The weapon inventory and similar widgets only show up when required, freeing up crucial screen space and giving players the knowledge they need to make quick decisions during stressful situations. The interface performs well in bright and dark settings due to its straightforward design and white colour scheme, often contrasted with dark backgrounds. The interface also uses simple symbols for weapons and ammunition that blend perfectly with the game's environment while keeping a slightly minimalist aesthetic. The user interfaces are also both aesthetically pleasing and useful at the same time. Overall, the design of the interface is the ideal mix of clarity and player by providing important information without taking away from hampering the player's attention.

Figure 3: The Last of Us Part 2 Minimalist UI

3.7.2 Dead Space

In the game Dead Space, the UI is seamlessly integrated into the game world, using the player's RIG to display vital information without relying on typical on-screen overlays. The player's health and stasis charge are shown directly on their back, while the ammo count shows as a holographic number on the weapons rather than as a separate HUD element. This is known as spatial, diegetic UI, whereby the HUD elements are a part of the in-game world rather than the player's flat widget that the in-game character can't see. This approach keeps the player's focus on the centre of the screen, reinforcing immersion by eliminating unnecessary distractions.

Every element of the UI serves a narrative and gameplay purpose. Videos and audio logs play in front of the character rather than in separate menus, ensuring the player remains game with the world rather than looking away at interface elements. Similarly, the game's menus and tutorial prompts appear as holographic projections, keeping the protagonist visible in the frame. This game's detail emphasises that the UI is not just for the player—it exists within the game's world, making it feel more natural and believable (Kraj, 2020).

One of Dead Space's most effective design choices is how it limits peripheral vision when checking resources. To see their ammo count, players must raise their weapons, causing the camera to zoom in and reducing their awareness of the environment. This deliberate choice heightens tension, forcing players to focus on the immediate moment rather than comfortably scanning their surroundings (Dakinedi, 2018). By embedding every interface element into the game world, Dead Space creates a minimalistic yet highly immersive experience, demonstrating the power of diegetic UI in horror game design (Smith, 2023).

Figure 4: Dead Space Minimalist Diegetic UI

3.7.3 Ghost of Tsushima

Ghost of Tsushima is widely praised for its minimalist and immersive UI, which enhances the player experience by reducing on-screen clutter while still delivering essential information effectively. Unlike many open-world games that rely on intrusive HUD elements, Ghost of Tsushima keeps most UI elements hidden by default, allowing players to focus on its stunning recreation of 13th-century Japan. This "just enough" approach ensures that information is readily available when needed but never overwhelms the screen (Bone, 2021).

One of the most innovative UI features is the Guiding Wind mechanic, which replaces traditional mini-maps and waypoints with a natural, in-game navigation system. A simple swipe on the controller summons a gust of wind that visually and audibly directs the player, seamlessly blending function with immersion. This mechanic not only enhances immersion but also reinforces the game's thematic connect game's nature and the samurai's spiritual journey (Marwan Abd El-Ghany, 2024).

The game's HUD is similarly restrained, displaying health, stance indicators, and resolve meters only when necessary. This contextual approach ensures players can focus on cinematic combat and breathtaking landscapes without distraction. By integrating UI elements naturally into the world, Ghost of Tsushima sets a high standard for minimalist UX design, proving that a well-crafted interface can be functional and immersive without sacrificing aesthetics.

Figure 5: Ghost of Tsushima UI

4. Research Methodologies

This study investigates the effectiveness of minimalist UI design in enhancing player immersion by developing, testing, and iterating two UI artefacts within Unreal Engine 5's UMG (Unreal Motion Graphics) system.

4.1 Creation of Artefacts

4.1.1 First UI Artefact

To plan the design of the first UI, the tool Figma was used to create an initial UI concept for this project before creating the interface in Unreal Engine. This concept was created based on the many different minimalist UI principles and theories identified in this project's literature review.

- Fitts's Law - To optimize button and interaction sizing and spacing.
- Hick's Law - To reduce cognitive load by limiting on-screen elements and options, ensuring easier decision-making.
- Gestalt Principles of Perception - To ensure effective grouping and layout by applying the different principles like proximity and similarity.
- Other Key UI Concepts - Including visual consistency, hierarchy and feedback to improve the immersion of the UI.

This UI has been developed modularly with UE5's UMG system, where individual UI child widgets have been created separately and added to a parent widget for better flexibility. This design choice allows for far easier future iteration and ensures that the UI elements are well-spaced and avoid excessive UI clutter.

This artefact has been created using the 'Action RPG Framework' provided by Epic Games as one of their sample projects (Epic Games, ND), which serves as the environmental foundation for this project. This framework has no interaction with the user interface and instead serves as context for the interactivity without interfering with the UI and its functionality.

4.1.2 Second UI Artefact

Following the initial testing process, the first iteration was evaluated through user perception testing and analysis with a comparison to minimalist design theories, concepts, and principles researched in this study. A second UI iteration will be created on Figma and then developed in the engine. This iteration aims to improve on the first iteration in these areas:

1. UI Layout – Resizing and repositioning of different elements.
2. Visual Hierarchy – Ensuring that certain key elements are emphasized.
3. Feedback Improvement – Enhancing visual feedback such as buttons and animations.
4. Clutter Reduction – Ensuring that redundant elements are resized or removed.

This iterative approach will ensure that the design improvements are feedback and user-experience driven to allow for maximum usability and immersion.

4.2 Artefact Testing

The artefacts in this study will be evaluated using two methods:

- Method 1. Using user perception testing through the user of open-ended questions in a participant survey.
- Method 2. Using minimalist UI design theory, concept, and principle comparison and evaluation.

4.2.1 User Perception Testing

To assess the UI's clarity, usability, and immersion, 10 participants will be asked to test the first UI artefact and complete a qualitative survey containing these open-ended questions:

1. How easy was it to understand the information presented on the UI?
2. Did you feel that at any point the UI was too distracting?
3. Was there any information you felt was missing from the UI that would be helpful?
4. Did you feel that any of the UI elements were unnecessary or could some of it be removed?

5. What changes or improvements would you suggest for the current UI design?

The second UI iteration will be developed after completing this first round of feedback and UI evaluation. The same participants will then be asked to complete the same survey after testing the new iteration, with two additional questions:

1. Do you believe the second iteration of this UI is an improvement from the first version?
2. Please provide a reason for your answer.

This iterative method will ensure a set of measurable improvements between both versions of the interfaces.

4.2.2 Theoretical Evaluation

To provide a more objective measurement of the UI's design effectiveness, both interfaces will be analysed and evaluated based on the design theories, concepts and principles researched in this study. Both UIs will be analysed as a whole using a structured plan that evaluates:

- Fitts's Law
- Hick's Law
- Gestalt Principles of Perception
- Key UI Concepts

This dual evaluation approach, which uses both subjective user feedback and theoretical validation, allows for a detailed analysis of the UI's effectiveness, ensuring that the UI is in line with good user perception and is technically sound.

4.3 Primary and Secondary Research

This study uses both primary and secondary research methods to ensure a more well-rounded evaluation of the interface's effectiveness.

4.3.1 Primary Research

The primary research for this project consists of using the aforementioned survey to gather feedback on the UI artefact's effectiveness and ability to provide an immersive experience. This survey's data allows for the evaluation of user perceptions, identification of areas for improvement, and a much easier process of iterative refining of the UI designs to better meet the objective of providing an immersive experience without damaging the UI's usability.

4.3.2 Secondary Research

The secondary research for this project has been carried out by reviewing existing literature on design concepts, theories, and principles relevant to a minimalist UI, as well as the negative effects of having a poor and cluttered UI. This research served as the foundation for planning suitable artefact designs and concepts and later helped in the actual creation of the artefacts.

4.4 Qualitative Data

Given the subjective nature of UI evaluation, this study focuses on using qualitative data collection over quantitative data. User feedback is gathered through open-ended survey responses, providing valuable insights into a user's perception of the UI's usability and immersion. This feedback can offer suggestions on how to improve the interfaces and offer the ability to compare and contrast the two UI versions through a direct comparison of the survey's results. Additionally, theoretical comparisons ensure that design changes to the second iteration align with the academic findings in this study's literature review.

Data from both testing phases will then be analysed and contrasted to identify patterns in the user feedback, allowing for a structured comparison between the UI iterations. This approach ensures that design improvements are driven by both practical and subjective user insights as well as minimalist design theories, concepts, and principles.

4.5 Data Collection and Analysis

4.5.1 Data Collection

To effectively measure UI effectiveness, two rounds of data collection are conducted. User surveys provide qualitative results, which are analysed to show recurring usability themes, issues, and trends. In the second survey, after the users have played and tested the new UI iteration, the same five questions from the first survey are presented to the user once again, this time with the addition of two extra questions, as mentioned earlier. Additionally, theoretical evaluation of the UIs ensures that the UI design and modifications will remain consistent with established design theories, concepts, and principles.

The participants for the first survey will be a group of 10 students and faculty from the university, recruited through an open call for volunteers. The same 10 students and faculty are then returned to and asked to complete the second survey once the new UI iteration has been completed. This means there are two sessions, each taking approximately 10 minutes: 5 minutes to test the interface in the game world and 5 minutes to complete the questionnaire.

4.5.2 Data Analysis

In terms of data analysis, the results from the first survey are analysed by comparing each user's answers to identify how the UI should be improved for the second iteration. To analyse all the qualitative data gathered throughout this project, results from each survey are directly compared to show if and how a user's perception of the interfaces has changed between the two versions. This data will show if the changes made to improve the first interface have positively increased a user's immersive experience or if the changes have hampered the UIs usability.

4.6 Justification of Methods

In this study, the use of qualitative data, primarily through the use of surveys, can be justified due to the subjective nature of the research focus. Since this study aims to explore user

perceptions of minimalist UI in an immersive gameplay setting, qualitative methods are suited well for capturing user-driven insights and experiences that are typically difficult to quantify. Braun and Clarke (2006) state that "Qualitative approaches are incredibly diverse; complex and nuanced and thematic analysis should be seen as a foundational method for qualitative analysis". This reinforces the idea that qualitative research is an appropriate method for analysing subjective user experiences compared to using a quantitative data approach.

Regarding data collection and analysis, statistical tests such as T-Tests and the Mann-Whitney U test are frequently used quantitative research methods used to compare groups of numerical data. For example, a t-test could be used to assess whether the means of two groups are statistically different from each other, assuming the data is normally distributed and measured on an interval or ratio scale (Hayes, 2023). On the other hand, the Mann-Whitney U test could be used to compare differences between two independent groups when the dependent variable is either ordinal or continuous but not normally distributed (McClenaghan, 2022). Although using quantitative research methods such as T-Tests or the Mann-Whitney could have been a viable option, a subjective, non-numerical approach is more appropriate for this study. This is due to the fact that the research focuses on personal user experiences and perceptions, which are qualitative and not easily quantified. Furthermore, using qualitative data such as measuring response time or eye-tracking would involve using specialised equipment and recourses outside of this project's scope and time limitations. Therefore, qualitative methods were selected to best capture and understand the user experience and insight gained from testing the minimalist user interfaces made in this project.

4.7 Additional Considerations

One potential challenge of this study could include bias in user responses. Participants may have personal preferences in UI style, genre, and layout that may influence their evaluations. To mitigate this, data analysis will focus on identifying common trends across multiple participants to ensure that findings are more representative rather than more anecdotal. Additionally, while using a sample size of 10 participants may be appropriate for the qualitative

analysis in this study, future studies may benefit from gathering data from a larger participant pool to improve the quality of data received.

5. Results and Findings

5.1 Introduction

This section presents the findings from two rounds of user surveys, which gathered qualitative feedback on the clarity, usability, and immersion of the two UI iterations developed for this study. The first survey evaluated the initial UI iteration, while the second assessed the revised UI design, incorporating user feedback and refinements. Alongside user perception testing, the UI was assessed through theoretical evaluation against established design principles, including Fitts's Law, Hick's Law, Gestalt Principles of Perception, and other key UI concepts. These findings are reported objectively, without interpretation or analysis, which will be addressed in the subsequent discussion section. All answers to both Survey 1 and 2 can be found in Appendix 1.

5.2 First UI Iteration Findings

The first round of user testing involved ten participants who provided feedback on their experience with the initial UI. Their responses were grouped by question, highlighting key themes such as clarity, distraction, missing information, unnecessary elements, and suggestions for improvement.

5.2.1 First UI - Clarity and Ease of Use

The first question posed by the survey asked the participants whether they felt the interface was easy to use and understand. The responses indicated that participants found the interface intuitive and easy to understand, with multiple individuals describing it as "clear" and "very easy" to understand. One participant stated that the UI elements were "clear to read and had intuitive icons", while another noted that "the UI was simplistic and easy to read".

5.2.2 First UI - Distraction and Immersion

Answers to the second question indicated that none of the participants found the UI distracting. Many of the participants stated that "No", the UI was not distracting, with one participant saying the UI was "nicely minimalist" and another saying the "UI seemed out of the way unless looked for". Another participant stated that "everything felt neatly packaged away", and one user commented how they "liked that it effortlessly fades away and comes back once clicked".

5.2.3 First UI - Missing Information

Although some participants reported that the UI contained all necessary information, others gave suggestions of information they felt may have been missing. Two participants mentioned a lack of on-screen controls, with one stating that "you may want to consider having controls appear on the UI itself" and another saying, "how to use the abilities would of been good". A couple of participants also mentioned that without having more context of the game, they could not tell if more information was required.

5.2.4 First UI - Unnecessary UI Elements

The general consensus among participants in response to the fourth question was that the UI contained only essential elements and did not feel cluttered. One participant suggested "simplifying the animation of the map being hidden/shown", with another participant saying, "maybe time?" in response to which elements may be unnecessary. However, the general response was that all of the displayed elements were necessary, with one user saying, "For an RPG it seems like all the elements would be relevant", with another saying that the "UI was very on point and not unnecessary".

5.2.5 First UI - Suggested Improvements

Participants provided several suggestions for improving the UI's usability and immersion. Common themes included a preference for smoother UI animations, smooth health bar transitions, and some changes to the ability bar, such as making it "transparent but still visible" and "some way to see info on the abilities".

5.3 Second UI Iteration Findings

Following the first round of testing, a revised UI iteration was developed based on participant feedback. The same ten participants provided feedback on the second version of the UI.

5.3.1 Second UI - Clarity and Ease of Use

Responses to the first question described the updated UI as easy to use and understand, as the majority of participants replied with "very easy" or "easy" to the question. One of the responses stated that it was a "very easy and straight forward process", with another participant stating that it was "Easy to understand. Visuals are clear, and while information is minimal, it feels that necessary on-the-fly info is readily available". One of the participants responded almost directly to the title by stating that understanding the interface was "Nice and easy showed enough and it was minimal".

5.3.2 Second UI - Distraction and Immersion

According to the survey, no participants found the updated UI distracting, with participants frequently replying "no" in response to the question asking whether the UI was too distracting.

5.3.3 Second UI - Missing Information

Most participants stated that the UI contained all necessary information, with nothing missing. Only one response provided information on what they felt was missing from the UI, including "a yellow health bar to indicate the amount of damage taken then the health bar updates", referring to the idea of two bars in the health bar, one that shows the exact health, and one showing how much the health has dropped by when the player took damage. Another response stated that there was no missing UI information. It stated, "Even though details about the abilities are not present, it can be assumed that the player would contextually know these details (as similar games would show these details in an ability selection menu). Ability details are often absent from the HUD/quick-use, as seen here."

5.3.4 Second UI - Unnecessary UI Elements

No unnecessary UI elements were identified in the surveys for the second UI iteration, with one participant responding, "No, it was perfectly minimalist", and another stating that "now that the time and map can be hidden everything is relevant". Most of the other responses simply stated "No" to the question of any UI elements being unnecessary.

5.3.5 Second UI - Suggested Improvements

In terms of suggested improvements, one participant provided the idea of "Perhaps a small icon to accompany the weather indication could be nice? (sun when clear, stormcloud when stormy, etc)". Another participant stated that there could be "maybe a way to scroll through the abilities, know how to use them and how to choose them". The final response suggesting feedback stated that, "Other than health changes no", referring to the yellow health bar idea from question three regarding missing information.

5.3.6 Second UI – Improved Overall

During the second survey, participants were asked if they believed the second version of the UI was an improvement over the first. The results indicated that all ten participants voted that 'Yes' there was an improvement.

The following question asked participants to give a reason for their previous answer. Here are the provided explanations that followed explaining why they believed the second UI was an improvement on the first:

- “Lot smoother animations
- “The player is now able to understand how to use the potions. When it is a pick up it is also obvious which potion it is that the player is picking and how to locate it. “
- “Smoother and more cleaned up.. “
- “It was good “

- “Ability cooldowns added, more smooth animations (which are still subtle), clearer indications of time and weather. Minimap animation significantly less distracting (is not distracting now). All feels more complete and cohesive. “
- “smoother animation “
- “the animations were way smoother and the controls were helpful “
- “It is much better. The addition of the controls, the simplified map animation, and the other animations make it better than the first version. “
- “I like the new boxes around map and health. “
- “The first one was clear and the new one is still clear but shows more info and presents it in a better way”

5.4 Theoretical Evaluation

In addition to user perception testing, both UI iterations underwent theoretical evaluation and comparison to established design principles, including Fitts's Law, Hick's Law, Gestalt Principles of Perception, and key UI concepts that were researched in the literature review section of this paper. These evaluations were applied to assess structural differences, layout organisation, and visibility of the interactive elements across both versions.

5.4.1 Iteration 1

The first UI iteration adhered to minimalist principles by maintaining a modular UI structure that minimised certain elements after ten seconds of inactivity. The potions and ability bars were presented in a large, highly visible format but were either fully or partially hidden in the minimised state.

Fitts's Law applies to this UI, as elements were made clearly visible and easily distinguishable when the UI is in its complete state. Due to the lack of on-screen controls and the UI minimisation completely hiding the abilities, players had to rely on memory to recall specific information like key binds and ability availability. Hick's Law, which emphasises reducing cognitive load by limiting choices, was applied by only having mostly necessary on-screen

elements and through minimising the UI. However, a player's memory would once again have to be relied upon during the minimised stage as the potion names were also hidden, which would increase a user's cognitive strain. The Gestalt Principles of Perception were partially applied with this iteration. Both proximity and similarity were achieved through the logical grouping of elements, such as the grouping of the potion elements, ability elements, health and mana elements, as well as map and time elements. Continuity is also maintained due to the smooth transition between the full and minimised state. Furthermore, figure-ground relationships are used when the UI is blended into the background using different levels of opacity and blurs.

Regarding key UI concepts, visual hierarchy was present in both the full and minimised UI as critical elements were well linked and less important elements were hidden during the UI minimisation. Feedback was very limited in this version, with a lack of animations and visual indicators for using items.

5.4.2 Iteration 2

The second iteration of the UI was changed by addressing the issues that were prominent in the first interface whilst also ensuring that a minimalist approach was kept. The most significant changes were the introduction of key binds for both the potions and the abilities, cooldown indicators for the abilities, as well as smooth health and mana decreasing animations. Additionally, the map and time display were also redesigned with a background for improved visibility and the option to be hidden using the 'M' key.

Fitts's Law remained relevant in this iteration, with adjustments ensuring that critical elements were more easily recognised. Adding key bind labels beneath each ability and next to each potion provided obvious and immediate reference points to stop users from having to recall the information. Hick's Law was also maintained by hiding non-essential information whilst also ensuring that all vital information remained available. Unlike the first version, where the ability bar was removed completely, this version retained visual indicators while keeping the

UI compact to reduce cognitive strain. The Gestalt principles of perception were also applied more effectively in this version. Proximity and similarity were reinforced, as group elements remained logically associated even in the minimised stat, with extra borders making the groups more obvious. The continuity principle was also improved, as transitions between the full and minimised UI states were made much smoother whilst also keeping certain elements, such as the abilities, on the screen during the minimised state to ensure that no information is lost. Furthermore, the principle of closure was also enhanced by ensuring that elements such as the ability bar would subtly remain on the screen rather than completely disappearing from it.

In terms of key UI concepts, the visual hierarchy of the second iteration was also improved as the new borders, as well as the smoothly animated health and mana bars, helped to provide more precise feedback to the players. This is because smoothly updating the values gives the user a far clearer indication than instantly updating them. The use of cooldown indicators, as well as the use of animations for the abilities, also provided more direct feedback to the user, ensuring that players could immediately gauge the availability of the different skills. Finally, displaying the key binds for the potions and abilities further reinforced the idea of consistency by making the UI more intuitive without adding unnecessary visual clutter.

6. Discussion and Analysis

This study explored the effectiveness of minimalist UI design in enhancing immersive gameplay through an iterative design process. The research problem, titled "Designing a Minimalist UI for Immersive Gameplay", guided the investigation into how UI elements influence a player's sense of immersion and usability within a gaming environment. The study aimed to assess whether a minimalist approach to UI could reduce a player's cognitive load and on-screen visual clutter while providing players with all the necessary information to play the game.

The findings from two rounds of user testing indicated that a minimalist UI approach was generally well received, with participants consistently reporting that the interface was straightforward, easy to understand, and unobtrusive. Furthermore, the second UI iteration showed usability improvements, with all participants agreeing that it improved over the initial version. The theoretical evaluation further demonstrated that both UI iterations adhered to key design principles such as Fitts's Law, Hick's Law, and Gestalt Principles of Perception. However, certain elements were refined in the second version to enhance feedback and interaction. This section discusses the importance and significance of these findings, their implications within the field of game UI design, their relationship to established literature, and the study's limitations.

6.1 Interpretation of the Findings

The results of this study suggest that a well-designed and implemented minimalist UI can successfully allow for both usability and immersion by ensuring that only the most essential information is displayed while also keeping elements that are less critical unobtrusive or even hidden. By focusing on the ideas of simplicity and clarity in the UI's design, participants consistently stated that the UI was easy to use and understand, indicating the importance of using a minimalist design concept. This supports existing literature by Lidwell et al. (2010), which emphasised that effective UI design should prioritise accessibility and user-friendliness.

As discussed in section 3.5, Hick's Law states that an increase in the number of choices for a user results in drastically slower response times (Hick, 1952). These findings align with this theory as the study demonstrated that reducing on-screen clutter allowed players to focus more on the gameplay, resulting in a reduction in cognitive load.

As discussed in section 4.5.2, participant feedback highlighted the importance of keeping only essential UI elements visible, while less important information was either minimised or hidden entirely. In the first UI version, the lack of key bind indicators for both the abilities and potions created a reliance on player memory, which could have led to increased cognitive strain. This was then reflected in the survey responses, where multiple participants noted that they struggled to recall the key binds for different interactions and that they should be added to the UI. In the second UI iteration, these issues were addressed by adding clearly labelled key binds next to each interaction that required them. This ensured players could access the necessary information for each interaction without additional cognitive effort. This improvement also aligns with the findings of Weibel & Wissmath (2011), who stated that excessive on-screen information can overwhelm users and detract from their immersive experience.

Fitts's Law, which emphasises the relationship between target size and selection time (Fitts, 1954), was also relevant to this study. While this principle is typically regarding interactions with buttons, its relevance in this study can be observed through the positioning and visibility of the different UI elements. In the first iteration, the lack of key bind labels on the abilities and potions resulted in a reliance on player memory, which could increase cognitive strain. This was further compounded during the survey when multiple participants stated issues regarding the lack of on-screen key binds. The second iteration improved on this by providing clear key bind indicators, reducing the need for a user to attempt to recall the information, in turn reducing cognitive strain and improving usability. Furthermore, as discussed in section 5.4.2, the key binds chosen for each interaction were also chosen intentionally as the buttons of 'Q', 'E', 'R', and 'F' all lay close to the user resting hand, whilst using '1', '2', and '3' for the potions

works in the same way, whilst ensuring that they flow logically and iteratively further aligning with Fitts's Law.

The Gestalt Principles of Perception, outlined in section 3.5.3, also played a significant role in creating and structuring the different UI versions. Proximity and similarity were used to group related elements, such as the potions and abilities, to ensure that users could quickly understand which elements were aligned and related. The second iteration refined this further by adding more visual separation from the game's environment through the use of subtle borders, further improving a user's ability to distinguish different elements. This aligns with previous research indicating that well-structured UI elements reduce cognitive effort and allow for faster information processing (Lidwell et al., 2010).

Additionally, the results supported the importance of feedback mechanisms in UI design. As discussed in section 3.4, effective feedback in a UI ensures that players can quickly understand different responses in the system. In the first iteration, the lack of visual indicators for potion and ability usage and for when a player is at low health meant that players had to rely on trial and error to confirm their actions. The second iteration addressed this limitation by introducing use animations to both the abilities and potions, as well as cooldown animations for the abilities and smooth health bar animations. This ensured that players could receive immediate and intuitive feedback from the interface. This aligns with Norman's (2013) claim that feedback is essential for maintaining user engagement and prevention.

Overall, the findings indicate that the second iteration of the UI successfully addressed the shortcomings of the first iteration by integrating key bind labels, refining UI minimisation, improving visual hierarchy, and enhancing feedback mechanisms. These improvements directly contributed to increased usability and immersion, supporting the effectiveness of minimalist UI principles in game design.

6.2 Comparison to Previous Research and Theoretical Frameworks

This study's findings make a valuable contribution to the broader understanding of minimalist UI design through the demonstration of its real-world, practical applications in a role-playing game framework. By reinforcing the idea that both simplifying a UIs visuals whilst also reducing visual clutter can enhance immersion, this investigation aligns with past studies that investigate the significance of unobtrusive user interfaces for player focus (Meyer, 2015). These findings further stress balancing minimalism and ease of use. Whilst minimalism seeks to trim down unnecessary elements, this study demonstrates that crucial gameplay information must always be provided to avoid issues with usability. Furthermore, the iterative nature of this design process shows how making minor enhancements, such as adding smooth transitions or adding subtle feedback mechanisms, can significantly enhance user experience.

This research also has implications for future studies in game UI design. On a practical level, game designers can use and apply these findings to optimise and enhance the useability and immersion of their own user interface systems by making essential elements clearer while minimising visual clutter and reducing cognitive load. Furthermore, the research emphasises the significance of traditional design theories, concepts, and principles, showing that they remain relevant in present-day UI design. Additionally, this research also has significant implications for future research in the field of game user interface design, especially regarding understanding and examining the applicability and usability of minimalist design principles across different genres. Although this study was applied to an RPG template, the principles researched could be applied across other genres such as first-person shooters and strategy games, and result in a similar effect.

6.3 Contribution of the Study

The current research findings align with previous research associated with UI design and cognitive load. The findings affirm Norman's (2013) claim that good UI design must emphasise user clarity and feedback. Further, the iteration between the two UI designs supports the theory of Hick's Law, whereby the elimination of complex choices can aid a user in making decisions more quickly (Hick, 1952).

In addition to this, this research supports previous research done by Meyer (2015) that argued that minimalist UIs should focus on the key elements without distraction from the main gameplay. Furthermore, the results also align with those of Lidwell et al. (2010), who emphasised the importance of visual hierarchy and feedback in user interface design. The utilisation of Gestalt Principles in this study also continues to validate the findings of Wertheimer and Riezler (1944), who indicated that individuals tend to perceive related elements as groups when the principles of proximity and similarity are successfully applied.

6.4 Limitations of the Study

Although there were many insights gained from this study, there were also many limitations, such as the project's sample size, scope, testing methods, and duration. The sample size used for the user testing was a significant limitation of the project. Although the qualitative research enabled detailed subjective insights of a user's perspective, the small number of participants restricted the generalisability of the results. A more diverse and more extensive pool of participants would most likely have given a much wider variety of views, minimising the possibility of the findings and, therefore, changes being distorted by bias, personal taste, or prior gaming experience. The small sample size raises the chances of bias, as individual opinions may have inadvertently influenced the results.

The second limitation is related to the scope of the research, as testing was conducted and confined solely to an RPG framework. Since UI requirements vary from genre to genre, the

findings in this study may not be universally applicable across gaming. For example, First-person shooter games, strategy games, or puzzle games all have majorly varying UI requirements; therefore, the concepts tested in this might not directly translate to those genres of games. The lack of translation across genres limits the ability to assess how widely the results can be applied.

Another limitation of this study is that the research only focused on just two iterations of the UI. This meant there was a lack of ability to view and record the incremental improvements over multiple iterations. Evaluating more UI versions over more time would have given a clearer indication of how multiple iterations would have affected the usability and immersion of the UI. Without more iterations, it is more difficult to determine whether the user-observed improvements were the result of a trend of iterative improvement or a one-off change.

This study's methodology section also introduces certain limitations. While the combination of user perception testing and theoretical evaluation provided somewhat of a balanced approach, the reliance on qualitative data alone meant that all of the results were inherently subjective. Personal preferences, gaming experience, and possible bias towards different UI types influenced the participants' responses. The absence of quantitative data, such as possible specific time measurements or different quantitative tests such as T-tests or Mann-Whitney U tests, results in findings that are purely based on participant experience and not on more objective useability measurements. This limits the ability to measure cognitive load or response efficiency, which could have provided further validation for the effectiveness of the UI designs.

The final limitation of this study is that it does not explore the long-term usability effects of the UI. Player interactions with UIs and UI elements may change over time as they become more familiar and more comfortable with using the interface. This means that the initial feedback a participant gave may not fully reflect how intuitive or immersive the UI is after a more extended

period of gameplay. A longer testing period with more testing sessions could have painted a more complete picture of how easy to use and immersive the UI is.

Overall, the limitations listed above do not invalidate the findings of this study but instead, highlight possible areas for future improvement. Proper consideration of the small sample size, limited scope, limited iterations, dependence on qualitative data, and absence of analysis over a more extended period of time is crucial while interpreting the findings in this study.

7. Conclusion

7.1 Overall

The primary objective of this research was to investigate the impact of minimalist User Interface design on enhancing immersive gameplay experiences. By exploring multiple different design principles, theories, and concepts, as well as conducting iterative design followed by user testing, this study aimed to understand how minimalist interfaces can reduce cognitive load whilst only presenting essential information in a clear and unobtrusive manner, therefore improving a user's gaming experience.

7.2 Research Overview

The research began with an extensive literature review, mainly focussing on important design theories, concepts, and principles of minimalist user interfaces. Key concepts such as Fitts's Law, Hick's Law, and the Gestalt Principles of Perception were researched in order to understand their impact on user perception and interaction in a game's environment. These principles provided a theoretical foundation for this study, ensuring that later design and evaluation stages were well-focused and informed.

User testing was conducted to assess the effectiveness of the UI iterations, gathering qualitative feedback on aspects such as clarity, distraction, usability, and overall immersion. The results indicated that the second UI iteration provided an improved user experience, with participants unanimously agreeing that the refinements made to the interface resulted in a more effective and engaging design.

7.3 Achievement of Research Goals

The findings of this study confirm that the project was able to successfully meet its primary objective of designing and creating a minimalistic user interface that enhances immersion without sacrificing useability. The iterative design process demonstrated that refining a UI based on user feedback and theoretical evaluation can improve player experience. The

study also reaffirmed the significance of using well-established UI design principles in relation to reducing cognitive load and improving visual clarity.

The first objective of this study was to examine existing literature and established UI/UX theories such as Fitts's Law, Hick's Lawn, and Gestalt Principles of perception to understand their implications in minimalist UI design for video games. A thorough literature review that examined important UI concepts and how they are used in game design was a necessary part of this study that was used to accomplish this goal. These ideas were used as a framework to guide the design and development of the UI iterations created during this study.

The second objective of this study was to examine the UI of games that already existed to pinpoint common issues with cluttered interfaces and successful minimalist design techniques from praised interfaces. This was achieved by critically evaluating both good and poor UI design choices in a structured analysis of a few chosen games from ranging themes and genres. The results emphasised the significance of minimalism in game UI design by highlighting common issues with cluttered UI, such as an excessive number of on-screen items and a poor information hierarchy.

The third objective was to develop two UI iterations using Unreal Engine 5's UMG system whilst optimising the user experience through the use of minimalist design principles. Two UI versions that prioritise clarity, usability, and immersion whilst adhering to minimalist principles were developed in order to accomplish this goal successfully. While the second iteration included improvements based on user feedback and more theoretical evaluation, the initial iteration was built based on the research undertaken in the literature review. Both versions' modular designs made it simple to make changes and iterate.

The fourth objective was to assess the UI prototypes' immersive qualities, usability, and clarity through qualitative user perception testing using surveys. To achieve this goal, direct participant feedback on both UI versions was obtained through structured qualitative

surveys. The responses provided valuable insights into user perceptions of clarity, distraction, usability, and immersion, enabling a deeper understanding of how minimalist UI elements are received in a game environment.

The fifth objective was to iteratively refine the UI based on user feedback, improving visual hierarchy, feedback mechanisms, and usability while maintaining a minimalist approach. This was accomplished in the second UI iteration, where important improvements were made in response to the information gathered during the initial testing phase. The improved iteration included better feedback mechanisms, enhanced readability, and more responsive UI elements, ensuring the design was more intuitive while still adhering to minimalist principles.

The final objective of this study was to compare and evaluate both UI iterations against established design theories and principles to assess their effectiveness in enhancing immersive gameplay. This was achieved by analysing both iterations and ensuring each design choice aligned with the principles explored in the literature review. This allowed for the affirmation that following minimalist UI design principles during the creation of a UI can lead to a more immersive gameplay experience.

Overall, this study achieved all six of the research objectives it set out to achieve. Each stage of the study was able to build upon the previous findings to create a more well-informed, efficient, iterative design process. The results demonstrate that minimalist design principles, when applied strategically whilst following other key UI concepts, can enhance immersion by reducing cognitive load and maintaining usability.

7.4 Contributions to the Field

This study contributes to the field of game UI/UX design by providing first-hand insight into how well minimalist UI concepts can enhance a player's immersion. Although previous research has examined the effects of minimalism in UI/UX generally, this study applies these ideas specifically to the gaming industry, providing developers with useful design insights

and techniques. The iterative approach used in this study highlights the importance of balancing usability, functionality, and aesthetics, with user feedback to create an effective UI design. Furthermore, by comparing both UI iterations to established design principles, this study was able to create a structured framework to evaluate minimalist UI effectiveness. Future researchers and game developers could use these results to guide their own UI design creation for minimalist interfaces that need to create an emphasis on immersion.

7.5 Final Reflections

This research has confirmed the significance of a UI's design in shaping the overall gameplay experience for a user, verifying the view that a minimalist UI implemented correctly can provide a strong sense of immersion without sacrificing usability. By reducing cognitive load and visual clutter and keeping all the essential information easily accessible, minimalist UI theories, concepts, and principles can enhance a user's immersion, leading to a more enjoyable gaming experience. Therefore, this study has successfully achieved its primary research goal and objectives, demonstrating that a minimalist UI can enhance immersion by reducing distractions, improving usability, and ensuring that players remain focused on gameplay. The findings highlight the importance of careful and deliberate UI design in modern game development whilst offering valuable insights for other developers seeking to create an engaging and immersive player experience through a minimalist user interface.

8. Recommendations

This section provides recommendations for future research based on the findings and limitations identified in the study. While the results demonstrated that minimalist UI design can enhance user experience and immersion in a gameplay context, several aspects of the study could be refined, improved, or expanded upon. These recommendations outline potential improvements for the methodology and considerations for future research in the field of UI and UX design.

8.1 Expand Participant Sample Size

By recruiting a more extensive and diverse sample of participants, the generalisability of the findings could be improved. Incorporating more individuals with varying game experiences, cultural backgrounds, and age groups could provide a much broader array of results whilst reducing the potential for bias and ensuring that the UI design appeals to a much wider audience.

8.2 Use A Wider Variety of Game Genres

Extending the research beyond a single genre, such as only role-playing games (RPGs), to include a much wider variety of game types, such as first-person shooters, top-down games, or platformers, could result in more accurate results for those different genres. This approach would allow for the assessment of minimalist UI principles across multiple different gaming contexts, allowing for the identification of genre-specific requirements and ensuring the adaptability of design recommendations.

8.3 Increase UI Iterations

Implementing multiple iterations of UI designs followed by user testing in each phase would allow for more accurate results and design choices. This iterative process would allow for continuous refinement based on the user feedback received in each phase, leading to a more intuitive and immersive user interface. Documenting each change and its impacts across the

different iterations would provide valuable insights into how the user experience has evolved over time.

8.4 Incorporating Quantitative Testing and Metrics

Using quantitative data collection methods, such as eye-tracking, response time measurements, or even numerical survey responses, alongside qualitative approaches, could allow for more accurate feedback and results. These objective metrics could offer more factual evidence of user engagement and cognitive load. This would complement the subjective user feedback and better support some of the qualitative survey responses, providing a more comprehensive evaluation of the UIs' effectiveness.

8.5 Increase the Scope of the Study

Increasing the length of the study to a more considerable amount of time to observe user interactions with the UI over extender periods would enable more long-term evaluations and analysis. Long-term evaluations can capture how user perceptions and interactions change and evolve as they become more familiar with the UI, revealing more significant insights into the interface's sustained usability and immersion effects. This approach can help understand the learning curve associated with the UI and its impacts on the overall gaming experience for a user.

8.6 Inclusion of a Control Group

Another recommendation for future studies could include the use of a control group. By having one group of participants interact with a standard or non-minimalist UI alongside another group testing the minimalist UIs, future research could better show the impact of minimalist design on user immersion by directly comparing the results of the two groups. The inclusion of a control group would allow for a clearer comparison of results, highlighting the exact improvements minimalist principles provide over more standard designs.

8.7 Using Focus Groups or Interviews

Finally, future studies could also benefit from replacing surveys with structured interviews or focus groups. While open-ended survey responses are effective for gathering qualitative data, structured interviews would allow for deeper, more nuanced feedback from users. Interviews or group discussions could clarify some of the more ambiguous responses and enable the interviewer to probe for further discussions and clarifications of user responses. This could enable a greater understanding of user attitudes, perceptions, and suggestions regarding the design of the UI. This approach would provide more in-depth qualitative insights and could also potentially reveal new areas for design improvements that surveys may not cover.

By implementing some of these recommendations, future research would have a more substantial basis to build upon existing findings to develop minimalist UIs that are both user-centred and adaptable across various gaming environments.

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Appendices

Appendix 1

Survey 1

Question 1: ‘How easy was it to understand the information presented on the UI?’

Responses:

ID ↑	Name	Responses
1	anonymous	Very Easy
2	anonymous	Very easy.
3	anonymous	It was easy. All elements were clear to read and had intuitive icons.
4	anonymous	yes I like the simple style but done well.
5	anonymous	Very easy, I assume the minimap is not fully set up yet though (it could do with a compass)
6	anonymous	Very easy
7	anonymous	Fairly easy to understand
8	anonymous	It was very clear to understand each section of UI
9	anonymous	The UI was simplistic and easy to read. UI felt responsive apart from the Map which when the button was clicked played an animation.
10	anonymous	Very easy.

Question 2: ‘Did you feel that at any point the UI was too distracting?’

Responses:

ID ↑	Name	Responses
1	anonymous	Not Really
2	anonymous	No, ui seemed out of the way unless looked for.
3	anonymous	No, it wasn't distracting.
4	anonymous	No not really there is a nice amount of screen so i can see what i am doing.
5	anonymous	Never, it is nicely minimalist. It also gave me the option to remove the map from the viewport.
6	anonymous	Not at all
7	anonymous	No
8	anonymous	No not at all, and I also liked that it effortlessly fades away and comes back once clicked.
9	anonymous	No, everything felt neatly packed away. However this would also highly depend on what type of game would be played with the UI, to combat this there is a popup which is great!
10	anonymous	No, the UI was not distracting at all. I liked the part where it got smaller :)

Question 3: ‘Was there any information you felt was missing from the UI that would be helpful?’

Responses:

ID ↑	Name	Responses
1	anonymous	No
2	anonymous	N/A
3	anonymous	The abilities at the bottom were simple and what they do can be assumed from their names and icons, although it could still be helpful to be able to see short descriptions of what they do (and specific information such as how long Rage lasts, exactly what it does, etc). Also, for now you have the debug text showing controls, and you may want to consider having controls appear on the UI itself (though this may be an intentional style choice on your part).
4	anonymous	Not that i can think of when playing the game.
5	anonymous	Not without knowing more about what is possible in the game. I would like to know what the abilities at the bottom do.
6	anonymous	No
7	anonymous	How to use the abilities would of been good
8	anonymous	No not at all, the Debug Controls could have a button that recalls it so you do not have to return to the first 'checkpoint' to reread it.. Maybe in the options inside some menu UI?
9	anonymous	When low on health a red overlay could add some missing information and allow the player to better understand the situation.
10	anonymous	Not without knowing more context of the game.

Question 4: ‘Did you feel that any of the UI elements were unnecessary or could some of it be removed?’

Responses:

ID ↑	Name	Responses
1	anonymous	UI was very on point and not unnecessary
2	anonymous	N/A
3	anonymous	I would suggest simplifying the animation of the map being hidden/shown. It feels like it lasts a bit too long and doesn't fully gel with the rest of the simple aesthetic of the UI.
4	anonymous	again no I like it works well together.
5	anonymous	I don't think so
6	anonymous	Maybe the mini map. Rather than having a mini map, maybe just have an option to open a large map with a button
7	anonymous	When you hide parts of the UI I feel like the abilities could of been shown still
8	anonymous	No, each feature felt intentional and was placed in a way that did not overwhelm the player. Even without the UI becoming minimal, it does not crowd the screen.
9	anonymous	N/A
10	anonymous	For an RPG it seems like all the elements would be relevant. Maybe time?

Question 5: 'What changes or improvements would you suggest for the current UI design?'

Responses:

ID ↑	Name	Responses
1	anonymous	not much but smoother animation maybe?
2	anonymous	The mana and health could be a little bigger to be seen in combat situations.
3	anonymous	As mentioned: some way to see info on the abilities, and speeding up + simplifying the map hiding/showing animation.
4	anonymous	maybe make the UI shirnk a little less often
5	anonymous	Smooth moving transitions on the health bar would be very nice
6	anonymous	Having a mini map and turning it into a big bag when you press pause.
7	anonymous	Everything seems fine to me visually
8	anonymous	Just a way to possibly recall the controls in case they've forgotten that is accessed through an in-game menu UI. I also did not know how to use the potions provided so maybe some visible instructions on how to use them
9	anonymous	Instead of making the ability bar disappear completely, you could make it transparent but still visible. (much like minecraft console Hot bar).
10	anonymous	Add some visible controls.

Survey 2

Question 1: ‘How easy was it to understand the information presented on the UI?’

Responses:

ID ↑	Name	Responses
1	anonymous	Easy to understand
2	anonymous	It was a very easy and straight forward process
3	anonymous	It was very easy to understand.
4	anonymous	Nice and easy showed enough and it was minimal.
5	anonymous	Easy to understand. Visuals are clear, and while information is minimal, it feels that necessary on-the-fly info is readily available.
6	anonymous	it was very easy
7	anonymous	very easy
8	anonymous	Very easy
9	anonymous	Very
10	anonymous	Pretty easy

Question 2: ‘Did you feel that at any point the UI was too distracting?’

Responses:

ID ↑	Name	Responses
1	anonymous	No not at all
2	anonymous	No, the UI was not too distracting
3	anonymous	No.
4	anonymous	No.
5	anonymous	No
6	anonymous	no
7	anonymous	nope
8	anonymous	Not at all
9	anonymous	No I did not
10	anonymous	No

Question 3: ‘Was there any information you felt was missing from the UI that would be helpful?’

Responses:

ID ↑	Name	Responses
1	anonymous	No all information was present
2	anonymous	No!
3	anonymous	A change in health such as a yellow bar to indicate the amount of damage that was taken then the health bar that automatically updates. EG. Health damage is changed then in the missing health a yellow section appears that lerps to the current health to better indicate the health removed.
4	anonymous	No
5	anonymous	No. Even though details about the abilities are not present, it can be assumed that the player would contextually know these details (as similar games would show these details in an ability selection menu). Ability details are often absent from the HUD/quick-use, as seen here.
6	anonymous	no
7	anonymous	no
8	anonymous	No, and the addition of the controls addressed my previous issue.
9	anonymous	I dont think so
10	anonymous	No

Question 4: ‘Did you feel that any of the UI elements were unnecessary or could some of it be removed?’

Responses:

ID ↑	Name	Responses
1	anonymous	No
2	anonymous	No, it was perfectly minimalist.
3	anonymous	No
4	anonymous	No
5	anonymous	No. It is pared back and simple
6	anonymous	none come to mind to fit this criteria
7	anonymous	everything was fine and nothing needed to be removed
8	anonymous	No, now that the time and map can be hidden everything is relevant.
9	anonymous	They all seemed necessary
10	anonymous	No

Question 5: 'What changes or improvements would you suggest for the current UI design?'

Responses:

ID ↑	Name	Responses
1	anonymous	NO changes that i can think of
2	anonymous	I'm not yet sure how to use the abilities from the ability bar, so maybe a way to scroll through the abilities, know how to use them and how to choose them. More information on each ability can be provided in the inventory menu.
3	anonymous	Other than health changes no.
4	anonymous	No
5	anonymous	Perhaps a small icon to accompany the weather indication could be nice? (sun when clear, stormcloud when stormy, etc).
6	anonymous	no
7	anonymous	nothing
8	anonymous	None
9	anonymous	None
10	anonymous	If I understood what the game was more I could probably have some more suggestions.

Question 6: 'In your opinion, do you believe that the second iteration of this UI is an improvement upon the first version?'

Responses:

Question 7: ‘Please may you give a reason for your answer.’

Responses:

ID ↑	Name	Responses
1	anonymous	Lot smoother animations
2	anonymous	The player is now able to understand how to use the potions. When it is a pick up it is also obvious which potion it is that the player is picking and how to locate it.
3	anonymous	Smoother and more cleaned up..
4	anonymous	It was good
5	anonymous	Ability cooldowns added, more smooth animations (which are still subtle), clearer indications of time and weather. Minimap animation significantly less distracting (is not distracting now). All feels more complete and cohesive.
6	anonymous	smoother animation
7	anonymous	the animations were way smoother and the controls were helpful
8	anonymous	It is much better. The addition of the controls, the simplified map animation, and the other animations make it better than the first version.
9	anonymous	I like the new boxes around map and health.
10	anonymous	The first one was clear and the new one is still clear but shows more info and presents it in a better way