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Understanding User Experience in Serious Games: The Role of Narratives, Game Design and Player Background

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Abstract

This paper presents findings from three user studies conducted on digital heritage games designed to foster historical understanding and emotional engagement through immersive experiences. The evaluated games - We Grew Up in War, Those From Below, and Gulag Diaries - explore historical narratives related to conflict, migration, and forced labor. The studies involved small-scale participant groups from culturally relevant backgrounds, utilizing a mixed-methods approach comprising established game experience questionnaires, structured interviews, and facilitator observations. The results indicate that participants generally responded positively to the games, particularly appreciating their narrative depth, audiovisual design, and emotional impact. However, the studies also identified areas for improvement in terms of usability, navigation, and onboarding, especially given that the games tested were in their alpha stages. Notably, individual differences in prior gaming experience, familiarity with the technology used, and prior knowledge of the historical subject matter significantly influenced how participants engaged with and interpreted the content, while gender was also found to be a moderating factor of game experience. The findings presented in this paper offer useful insights and recommendations for digital heritage games, with an emphasis on improving user experience while maintaining historical authenticity, engaging narratives, and interactive storytelling.

CCS Concepts

•***Human-centered computing***~*Human computer interaction (HCI)*~*HCI design and evaluation methods*~*User studies* •***Applied computing***~*Computers in other domains*~*Personal computers and PC applications*~*Computer games*

1. Introduction

In the era of digital media evolution, games are recognized beyond entertainment as powerful tools for education and engagement with difficult heritage topics [Bogo10]. Besides constituting a valuable outlet for relaxation, games can reduce stress, elevate mood, and also enhance solidarity and communication. Particularly in the context of difficult topics, serious games have shown potential to explore complex narratives, elicit emotions and raise awareness [SmKS19]. In contrast with purely entertainment games, serious games are designed with an educational purpose in mind, often dealing with challenging topics, including heritage dissemination [CaCC23, Kara24].

Previous studies have explored the capacity of serious games to interpret historical events with authenticity [Chap16], although they call for caution against potential oversimplification or – on the contrary – glorification of traumatic historical events [Mcca22]. More recent research has refined these discussions, focusing on user experience design and emotional resonance in digital heritage applications [DaKi22, WDLZ25].

Immersion, narratives and audio have been identified as core elements in enhancing engagement in heritage games [VKKK14], while in cases where real-world material is integrated, reports highlight the players' significant emotional connection to the game [MABP17, PuCh12]. Additionally, player background plays a significant role in shaping game experience. Gender may influence the player's perception of narratives [BRZK25], while prior gaming experience and familiarity with the respective gaming device can affect immersion, flow, and user satisfaction [CCSC12, DaKi22].

Despite existing research in serious games as vehicles for entertainment and awareness, there remains a need to further explore if games on difficult and emotionally intense topics can be enjoyable, which game attributes contribute to enjoyable experiences (if any), and how different players experience such games. Motivated by these overarching questions, this work set out to examine player experience and satisfaction, exploring three different serious game prototypes – all at their alpha development

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stage—each dealing with a different but equally complex heritage narrative. This variation in target games ensured that results are not due to a specific game topic, but can be generalizable, offering evidence-based perspectives on designing and evaluating serious games for sensitive heritage topics, especially in the context of iterative development.

Overall, the research questions explored in this work are:

(1) Can games on serious and potentially sad topics be enjoyable?
(2) What factors affect enjoyment in serious games?
(3) Does a player's gender impact perceived game satisfaction and experience?
(4) Does previous exposure to games affect game satisfaction and experience?
(5) Does expertise with the gaming device affect results?

2. Methodology

The methodology followed for these user-based studies focused on assessing game experience and game satisfaction of serious games, in accordance with the methodology presented in [NNFK25]. Although three different pilot studies were carried out, the procedure in each one was sought to be as uniform as possible to better streamline the study as well as to ensure consistency of results (see Figure 1).

At first, all pilots were carefully planned, addressing issues such as the selection and recruitment of participants, the preparation of informed consent documents, and the development of evaluation instruments.

Figure 1: *The evaluation methodology applied for the user studies*

In more detail, the recruitment process was carried out by the three museums and employed varied strategies, including convenience sampling and outreach to local schools. Schools, participants and/or their legal guardians received detailed information regarding the study's purpose, their tasks, and their rights, and informed consent was obtained before the conduct of the study.

Activities included also the preparation of all the necessary data collection instruments, pursuing both objective and subjective measurements, quantitative and qualitative. Objective measurements involved data collected through observation regarding user behaviors, system errors, and usability hurdles. Subjective measurements usually refer to users' perceptions of game attributes, and aimed to assess the user's individual experience, preferences, and game satisfaction, including components such as overall enjoyment, immersion, and flow. Combining both methods can result in a thorough evaluation to produce a balanced analysis of the game, considering that each may lead to different conclusions and contribute to a more complete picture [Horn06].

To ensure obtaining reliable data and enhance the credibility of the study, a set of validated questionnaires was used. These questionnaires have undergone thorough testing to make sure they consistently measure the constructs they are intended to assess, which includes measures such as user experience and satisfaction. In the context of this study, the Game Experience Questionnaire (GEQ) as it was validated by [LaBM18] based on the original GEQ instrument which lacked validation [PoKI07] and the Game User Experience Satisfaction Scale (GUESS) [KSSC20] were used to measure game experience and user satisfaction with the games studied. Based on findings and lessons learned [NNFK25], certain questions—such as those related to social connectivity—were removed, as they were not relevant to the games being tested. In addition, questions on personal gratification were removed from the first two studies, as they were not considered relevant for the specific game types.

During the experiment process, it was important for the facilitators to observe the participants and note any irregularities or problems, with regard to the game and the evaluation process itself, as well as any comments voiced by the students. To do so, an observation sheet was provided, allowing facilitators to record participant's ID, irregularities identified, such as equipment malfunctions or software bugs and the fixes that were provided to resolve them, issues raised regarding the questionnaires' clarity, comments vocalized by the participants during gameplay, either positive or negative, and any other issues of note, such as teacher or user attitudes or the experimental protocol.

In addition, a debriefing questionnaire was developed, allowing facilitators to conduct interviews with participants, following the completion of the gameplay. These interviews aimed to initiate discussion between the participants and the facilitators, providing a means for participants to further express their opinions on the game and possibly expand on their answers to the questionnaires. As a result, facilitators and, by extension, the game developers can get a deeper understanding of users' feelings and experiences. In this regard, the questionnaires featured questions regarding participants' opinion on their overall impression of the game, what they liked most, and what they liked least, if they would play the game again or suggest it to others, and their overall impression about the study itself.

Once the planning phase concluded, the small-scale studies ran, starting with an experimental testing phase (a dry run), during which the overall setup of the methodology was tested and adapted accordingly based on the results. Following the dry run, each study was executed, the results were collected, data was curated to ensure consistency and participants' anonymity, and the analysis and reporting of results followed. Analysis of qualitative comments received during the evaluations was conducted following the thematic analysis approach, with codes developed inductively by two independent researchers, and refined through iterative discussion to ensure intercoder agreement.

3. Procedure

Three phases composed each session, namely "Welcome" or "Pre-test", the "Main part" and the "Post-game" (Figure 2). During the "Welcome" part, the facilitators welcomed the participants, introduced the game under evaluation and provided information about the procedure. Following a brief introduction into the theme of the game (i.e., children lives during war, lives of immigrant coal miners in 1950s Belgium, or lives of prisoners in the Gulag forced labour camps), participants were presented with the first questionnaire—the background demographics questionnaire. This questionnaire aimed to collect information about their demographics, computer skills, and gaming experience.

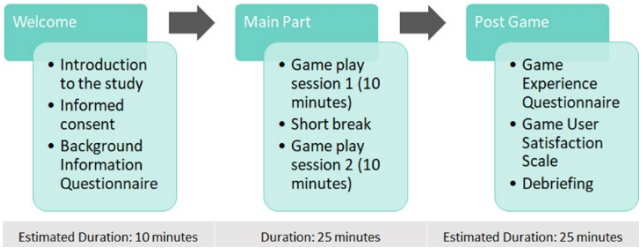

Figure 2: *Process for each evaluation session with main activities and estimated duration*

Proceeding towards the "Main part", the students were asked to switch into playing the game. This part was divided into two sections, each of about 10 minutes, with a short break in the middle, should the facilitators deem it important, depending on student engagement and interaction with the game. During the gameplay, the students were observed while they freely progressed in the game. Players were free to explore the game during both sections at their own will. Since the games used in the small-scale studies were still in their alpha stage, the foreseen time was adequate for their full exploration.

Finally, after the gameplay concluded, about 25 minutes were allocated to the "Post-game" part of the session. Participants filled-out two questionnaires assessing their impressions and satisfaction with the game and were also interviewed either grouped into pairs of two or individually. In the case of group interviews, particular attention was paid to ensure that all students had the chance to express their own opinions and perspectives.

4. User study 1: We Grew Up in War

4.1. The game

We Grew Up in War is a narrative video game, in which players make meaningful choices within a structured environment, with the goal of experiencing a series of emotionally and thematically connected scenarios. Developed by Charles Games in collaboration with the War Childhood Museum, the game explores the lived experiences of five children growing up during armed conflicts in Ukraine, Bosnia and Herzegovina and Syria over the past thirty years.

The gameplay of *We Grew Up in War* is structured around a loop of memory reconstruction and emotionally-driven interaction, situated within a framework that evokes archival practices and testimonial narrative design.

Each playable vignette begins in a spatial interface that visually resembles an archive composed of clusters of boxes. The player selects one of these memory boxes to initiate a vignette. When selected, the box opens in a short animation, revealing a fragmented diorama-like memory scene atop it that the player must complete. To reconstruct the scene, the player uses a drag-and-drop mechanic to match semi-transparent blueprints with silhouettes in the environment. Correct matches make the objects appear, completing the diorama.

Figure 3: *A Demonstration of Fragmented Memories in Play*

During the dialogue segment, characters in the scene, including the protagonist, begin to speak through stylized speech bubbles. These bubbles either contain non-interactive written dialogue, which the player advances by clicking, or they present the player with two emotion-based choice buttons (e.g., "angry" vs. "nervous"). After clicking and holding a chosen emotion button, the protagonist reacts according to that specific emotion.

The game employs the concept of a time capsule, where specific objects linked to a child's or adolescent's memory are encapsulated within self-contained "box-like" vignettes. These vignettes follow a narrative structure informed by cataloged interviews with historical witnesses. As illustrated in Figure 3, the narrative arc of Melisa, depicting an example of an internally displaced childhood, is momentarily paused, allowing adult Melisa or Melisa-as-witness to retrieve a specific memory fragment from her own "boxed memory" and reconstruct its essential contours. By placing an object, in this case, a car with a barricade blocking the passage, the voiceover of Melisa-as-witness is triggered, evoking a testimony delivered in the present, directly addressing the player. This emphasizes a sense of urgency, reinforcing that the dramatic events of the scene belong to the recent past.

Figure 4: *Demonstration of Psychological Distress Portrayal*

Each vignette functions as a memory medium, where the act of reassembling fragments serves as both an initiating activity and an expository tool for the narrative episode. This process guides the player's progression through the scene while also functioning as a digital curatorial gesture, echoing museum practices of assembling

and interpreting memory artifacts.

Through Melisa's story, we see an example of how the emotional weight of specific memories can be visualized. In Figure 4, Melisa is depicted in a refugee camp. Since this is a subjective memory of a young girl, the scene focuses only on key elements—her luggage, the bench where she curled up, and the indistinct figures around her. These dark, stylized silhouettes represent phobic and anxious states, transforming inner emotion into a visual metaphor.

The game's processing of historical narrative through interaction is further illustrated in Figure 5. Here, we see the category of "moving vignettes", where the pace of dialogue and atmosphere are shaped by the urgency of an imminent departure from a dangerous area. After selecting a specific emotion from the perspective of the main character, the protagonist engages in a conversation with Melisa's outraged mother. The dialogue between the two women provides context for past events and focuses primarily on the conflict between a parent and an adolescent, whose priorities and understanding of the world are still evolving. A similar approach can be observed in Figure 5 , which demonstrates the use of emotion-based options in a dialogue. This figure is particularly important , as it illustrates the moment before the dialogue unfolds, when the player determines the emotional stance of the protagonist.

Figure 5: *Demonstration of Emotion-based Interactive Dialogue*

We Grew Up in War blends narrative game design with museum curatorial practice to create an interactive experience that mirrors the War Childhood Museum's approach to storytelling.

4.2. Participants

A total of 14 participants, 5 male 8 female and 1 other, were involved in game assessment, aged between the 8th and 9th grade and one in 2nd grade of high school, all from Bosnia and Herzegovina. Regarding technology expertise, 4 participants use computers all the time, 2 often and 6 sometimes, with only 2 indicating that they use computers rarely. On the contrary, all 14 participants were very experienced in using smartphones or tablets. Regarding gaming experience, all the participants play video games for at least 5 hours per week, primarily on smartphones or tablets (7 participants), and gaming consoles (5 participants), with a preference for action-oriented titles.

4.3. Results

Analysis of results entailed the analysis of game experience based on questionnaires, interviews with participants and observers' notes. Participants generally had a positive experience with the game, with certain aspects standing out more than others, as indicated by the GUESS questionnaire results, reaching a high overall satisfaction (M: 5.12, SD: 1.60). Analysis of individual scales highlighted that narratives (M: 5.75, SD: 1.04) and audio aesthetics (M: 5.86, SD: 1.11) received the highest ratings, highlighting the game's well-received storytelling and sound design. Additionally, visual aesthetics (M: 5.57, SD: 1.17) also performed well, suggesting that players found the game's visuals appealing. Enjoyment (M: 4.04, SD: 2.17) was lower with a higher standard deviation, achieving an overall positive result, indicating, however, that this is a subjective feeling not always tied to aesthetics. Play engrossment (M: 4.93, SD: 1.84) and creative freedom (M: 4.89, SD: 1.40) fall within the mid-range, suggesting that while the game can be immersive, it may not provide much player agency. Considering that the game was by design more structured, the results acquired seem reasonable. The Usability score (M: 4.81, SD: 1.44) was also in the same range, highlighting there was room for improvement.

Results from the GEQ questionnaire yielded overall positive findings for all the scales studied. Negative affect (M: 0.89, SD: 1.15) and tension/annoyance (M: 0.83, SD: 1.15) received a low score, which is considered a good result indicating that players were generally not affected negatively or annoyed. However, challenge (M: 1.26, SD: 1.19) also received a mid to low score, which suggests that the game was not particularly challenging for the players. Flow (M: 2.26, SD: 1.36), immersion (M: 2.53, SD: 1.22), competence (M: 2.40, SD: 1.00), and positive affect (M: 2.39, SD: 1.13) received positive scores, highlighting the strengths of the game.

During the debriefing interviews with the participants, notably, all participants indicated that they enjoyed the game, describing it as "good", "enjoyable" and "interesting". A few participants mentioned that although they liked the game, it was sad, which encourages the conclusion that the game can immerse the players in the story of the characters. Indeed, the players answered that the story was what they liked most, with some of them also highlighting the racing mini game as an exciting part of the game. Almost all participants expressed their desire for learning what happened to the characters and how their stories evolved, thus verifying the effectiveness of the narrative regarding the game objectives. In the category of least favorite aspect, the participants were divided between the lack of instructions on how to assemble the scenes and the difficulty to figure out the radio controls, both of which they found hard to master. However, despite the small difficulties, the vast majority would play the game again and would recommend it to family and friends as well.

Overall, based on the results, it turns out that players appreciate the game's audiovisual and narrative strengths, and that although the game subject was sad they would like to play its full version. These results provide insights into R1, verifying that serious games – even with unpleasant topics – can be enjoyable.

5. User Study 2: Those From Below

5.1. The game

Those From Below is an interactive virtual reality experience developed by Causa Creations in collaboration with the Le Bois du Cazier museum in Belgium and Michele Cicora. Designed for the Meta Quest 3, the experience places players in the shoes of a migrant coal miner in 1950s Marcinelle, Belgium, offering an

intimate look into one of the darkest chapters of European industrial history. *Those From Below* uses game mechanics to educate players and encourage exploration about the topic. Interactive elements provide necessary background information and enrich the game by adding playfulness and interaction. The goal of the game is to educate players about the history of migration in Europe in playful and accessible manner.

The narrative is inspired by the life of Francesco Cicora, the father of Michele Cicora. Like many others after the Second World War, Francesco left his home country to work in Belgium's coal mines, a consequence of the post-war labor shortage and bilateral agreements between Belgium and various European nations. His goal was simple: to earn money to support his family from afar. Communication with his family remained limited to letters, as economic pressures and migration policies kept many families separated for long periods. Tragically, Francesco Cicora was among the 262 victims of the 1956 mining disaster at the Marcinelle colliery. A fire broke out underground, killing workers of multiple nationalities. It remains one of the most devastating industrial disasters in Belgian history, and its impact continues to shape discussions around labor rights, workplace safety, and the treatment of migrant workers across Europe.

In *Those From Below*, players assume the role of an unnamed migrant worker whose journey mirrors that of Francesco. Beginning with the miner's arrival in Belgium, the experience chronicles the early days of settlement, the harsh realities of life underground (Figure 6), and the social barriers posed by language and cultural differences.

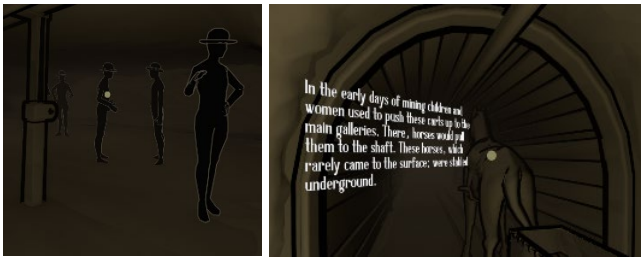

Figure 6: *Demonstration of the harsh realities of underground mines*

One aspect of the experience is its portrayal of the miners' living conditions. Many were housed in Nissen huts (Figure 7)—corrugated steel structures originally used as prisons for prisoners of war—repurposed to accommodate the influx of foreign laborers. These cramped and impersonal shelters highlight the harsh conditions many workers were subjected to upon arrival. The narrative also allows players a glimpse into the home country left behind: scenes of letters and small gifts being sent back to loved ones serve as poignant reminders of the emotional toll of migration and separation.

The central disaster of 1956 is depicted with sobering clarity, detailing not only how the fire began but also its broader consequences. The experience further explores the aftermath, drawing a direct line between historical events and contemporary labor protections, making it clear that the legacy of the Marcinelle tragedy continues to influence worker rights across Europe.

Narration by Michele Cicora provides a personal and human anchor to the experience. His voice serves as a bridge between past and present, honoring not only his father but also the thousands of families whose lives were irrevocably altered by similar stories. By giving voice to this history through personal testimony, the experience reinforces that these events are not abstract footnotes in history, but lived realities that shaped generations.

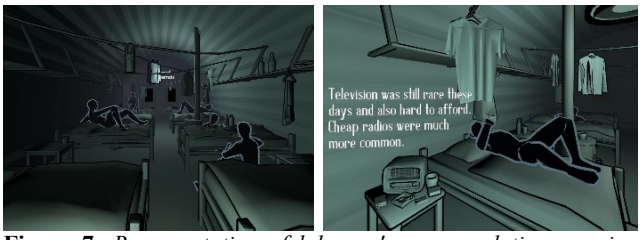

Figure 7: *Representation of laborers' accommodation, previously used as prisons*

By integrating historical records with personal narratives and virtual reality, *Those From Below* offers a nuanced medium through which to engage with and reflect on the lived experiences of migrant workers. It invites players not just to observe, but to feel the weight of the past and reflect on its lasting implications. In doing so, it stands as both a memorial and an educational tool.

5.2. Participants

In total, 15 participants from Belgium, between the ages of 17 and 24, 4 male and 11 female, took part in this study. Regarding technology expertise, 13 of the participants were quite experienced in using computers, indicating that they use this platform at least often, but also very experienced in using smartphones or tablets, since all 15 participants are using smartphones all the time. However, participants were not experienced with VR headsets, since the majority of them had only used the aforementioned equipment once or twice (8 participants) or never (5 participants) before the experiment. Concerning game expertise, all but 2 participants had prior experience in gaming, mostly on smartphone and tablet (7 participants), and computers (5 participants), playing mainly puzzle games.

5.3. Results

The results from the GUESS questionnaire indicate a positive overall experience (M: 4.53, SD: 1.60). Play engrossment (M: 5.46, SD: 1.37) and narratives (M: 5.25, SD: 1.38) received the highest ratings, suggesting that players found the game immersive and appreciated its storytelling. Visual aesthetics (M: 4.89, SD: 1.42) was also rated quite well, indicating a generally positive perception of the game's visuals. However, creative freedom (M: 3.54, SD: 1.40) and enjoyment (M: 3.96, SD: 1.82) were in the middle range, which suggests that players may have felt limited in their ability to make creative choices and that the game wasn't consistently fun for everyone. Moreover, audio aesthetics (M: 4.04, SD: 1.32) was also in the same range, implying that the sound design did not stand out as a particularly strong aspect. The usability score (M: 4.54, SD: 1.55) indicates that while the game is playable, there is room for improvement, for example with controls or mechanics, as identified through the debriefing interviews. Overall, players seem to appreciate the game's narrative and immersive elements but some improvements would be useful towards improving usability, audio aesthetics, and eventually enjoyment.

The results from GEQ indicated that the game received overall positive results, with positive affect (M: 2.43, SD: 1.13) yielding the highest score. Negative affect (M: 0.70, SD: 0.98) was quite low, which is also a particularly good result. Challenge (M: 1.78, SD: 1.24), flow (M: 1.53, SD: 1.39), immersion (M: 1.43, SD: 1.40), and competence (M: 1.28, SD: 1.19) scored lower than middle, highlighting areas for improvement in the game.

During the interviews, participants expressed positive attitudes towards the use of the VR platforms and enjoyed the combination of gaming while learning about history. However, the lack of tutorials on how to play the game particularly hindered the gaming experience, especially considering participants' minimal expertise with the specific technology. Additionally, since the version of the game that was used for the small-scale studies was still in alpha version, some aspects of the game were not fully developed, which prevented the players from being immersed and enjoying the game. The debriefing interviews provided useful comments on how to overcome the challenges that arose, such as for example by including a tutorial, or asking for increased sound immersiveness. It is also notable that players appreciated the game as a means for learning about history, and although they were unsure about playing at home, they stated that they would definitely play the game in a museum setting.

The facilitators of the sessions noted that due to some technical issues with the game, being in its alpha version, they were required to provide hints to players during gameplay (e.g. explaining that some features were not implemented), which could potentially hinder a fully immersive experience. Also, since many players were not accustomed to the VR platform, the facilitators spent some of the allotted session time on assisting with the use of VR. The unfamiliarity of most participants with VR technology required significant setup assistance for each individual. Unlike more conventional platforms like smartphones or PCs, VR demands hands-on guidance for navigating the interface, interacting with the environment, and understanding basic mechanics, which added complexity to the study process.

6. User Study 3: Gulag Diaries

6.1. The game

Gulag Diaries [SSAN24] is a walking simulator style environmental narrative game designed for PC, developed by FORTH in collaboration with the Gulag.cz Association. The game takes place in an abandoned labor camp along the remnants of the "Dead Road", a Soviet-era transpolar railway project constructed by Gulag prisoners between 1947 and 1953. The narrative reflects upon the events of a cartographic expedition undertaken by the Gulag.cz Association in 2013 in that area. The game combines the exploration-driven mechanics characteristic of walking simulator games [Worl00] with forensic investigation and photography-based gameplay, enabling players to uncover and witness the stories of Gulag prisoners through personal artefacts, documents, and letters scattered among the debris, using archaeological techniques.

Gulag Diaries is conceived as a historiographical video game, engaging with a historical theme and presenting arguments from a historian's perspective [Bazi22]. This approach contrasts with mainstream historically themed game development, where historical accuracy often takes a secondary role to commercial considerations [SmKS19]. From the outset of pre-production, the development prioritized collaboration with historical experts, including historians, archivists, archaeologists, and documentarians from the Gulag.cz Association, ensuring a research-driven foundation for the game's design.

Figure 8: *True-to-life representation of real camp*

The game places a strong emphasis on both preserving historical accuracy (i.e., the structure and plan of the physical site) and in fostering historical consciousness in players, by presenting eye-witness accounts, and personal memoirs of people who experienced incarceration in remote forced labor camps. To achieve these goals, an extensive photographic and archaeometry record created by Gulag.cz in 2013 was utilized, to inform the development of high-fidelity 3D assets and level environments. Further, digital twins of several artefacts of archaeological interest documented during the expedition (in many cases sourced from the Gulag.cz online photogrammetry repository) were used, to craft the historical narrative of the gulag experience, from the arrest and interrogation to eventual release and life after incarceration.

Figure 9: *Highly realistic artifact created with assets sourced from the Gulag.cz photogrammetry archive*

During gameplay, players navigate the hauntingly preserved remains of a fictional labor camp (Figure 8), modeled after the real Barabanicha camp documented in 2013, set within a dense taiga forest. In the role of a Gulag archaeologist, players are tasked with finding and analyzing personal artifacts, documents, and letters and completing their own archaeological record (the player's "Journal"). The discovered in-game artifacts trigger journal updates, enriching it with information about the artifact itself, narratives of prisoners' experiences. Some artifacts also trigger playback of videos produced by Gulag.cz, recounting prisoners' stories. These videos will offer players insight into real events, revealing the conditions endured by the victims of the Gulag system.

A primary objective of *Gulag Diaries* is to enhance player immersion and foster empathy for the people whose life stories are revealed while exploring the remnants of the labor camp. This is pursued through the photographic and video material embedded in the game, as well as the narrative and game environment which are deeply grounded in historical authenticity, offering a true-to-life representation of the architectural structure and condition of a Gulag camp. Extensive effort was dedicated to crafting a highly realistic virtual setting that captures the atmosphere of the abandoned camps in northern Siberia. To further enhance authenticity, various in-game artifacts were created using assets sourced from the Gulag.cz photogrammetry archive (Figure 9).

To create a seamless and engaging user experience, the game features a carefully designed, consistent user interface (UI). The aim of the UI is to provide players with an intuitive way to interact with the game, enhancing both playability and immersion. Visual cues, such as keyboard indicators, offer quick guidance on interacting with key game elements, including the map, journal (Figure 10), and "instinct" system, as well as the surrounding environment. Careful consideration has been given to the organization and layout of content to ensure clarity and ease of understanding for players. Visually, the UI is designed to align with the game's emotional tone, reinforcing a moody and mysterious atmosphere that enhances immersion.

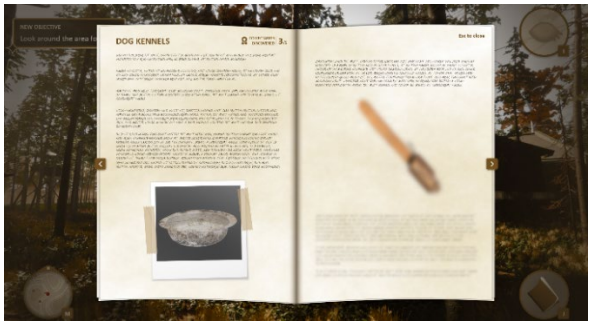

Figure 10: *Player's journal where all artifacts are included, featuring the handwriting of the real expedition manager from Gulag.cz*

6.2. Participants

A total of 16 participants, 10 male and 6 female, were involved in the studies on game quality assessment, between the ages of 15 and 22, all from the Czech Republic. Regarding technology expertise, most of the participants were quite experienced in using both computers (8 participants use computers all the time and 7 often) and smartphones or tablets (15 participants use smartphones or tablets all the time). Concerning game expertise, almost all of the participants had prior experience in gaming, with only one stating that they do not play games at all, divided equally on smartphone/tablet and computers as the platform of choice, playing mainly adventure games.

6.3. Results

Analysis of results entailed the analysis of game experience based on questionnaires, interviews with participants and observers' notes.

The GUESS questionnaire results suggest that participants had a generally positive, but somewhat mixed experience with the game. The highest-rated aspects were narratives (M: 5.50, SD: 1.16) and audio aesthetics (M: 5.28, SD: 1.22), indicating that the players particularly enjoyed the story and sound design. Personal gratification (M: 5.06, SD: 1.70) also scored well, suggesting that the game provides a satisfying experience for many players. However, play engrossment (M: 3.81, SD: 1.65) and enjoyment (M: 4.00, SD: 1.85) were closer to the middle end, implying that while certain elements were appealing, the game may not have fully captivated or immersed players. Visual aesthetics (M: 4.94, SD: 1.90) and creative freedom (M: 4.75, SD: 1.22) were positively rated but not as high as other scales, indicating that, while appreciated, they were not standout features. The usability score (M: 4.69, SD: 1.69) suggests that the game's controls and mechanics were functional but not flawless. Overall, the players seemed to appreciate the game's artistic and narrative elements, however, improvements could be applied to enhance player immersion.

Results from the GEQ questionnaire yielded overall positive findings. Positive affect (M: 2.21, SD: 1.12) received the highest score, indicating a generally positive attitude towards the game. Challenge (M: 2.20, SD: 1.08) has also received a high rating, which is favorable in games in general. However, tension (M: 1.73, SD: 1.19) was also rated rather high, indicating that any identified issues had an impact on players' gaming experience. Flow (M: 1.16, SD: 1.22), immersion (M: 1.69, SD: 1.42), and competence (M: 1.93, SD: 1.23) scores highlight that these features should be improved in follow-up versions.

In the context of interviews, the participants expressed a positive feeling towards the game, with most of them indicating that they liked the exploration aspect of the game and found the concept interesting. However, the majority of participants highlighted having trouble with orientation and how to move in the environment, both comments attributed to the lack of navigation information on the map, as well as having multiple obstacles in the main environment that did not allow passing through. Additionally, a recurring comment was the navigation inside the journal, which was characterized as non-intuitive, since page flipping was associated with an inverse keyboard action. Despite the aforementioned issues, the vast majority would play the game again if given the chance and would also suggest it forward to friends or family. The facilitators of the sessions also highlighted that all participants required a short tutorial on how to play before they could begin with the session.

7. Discussion and Conclusions

One expected outcome was that certain features were not yet fully developed in the alpha-version of the evaluated games. Technical and design limitations that affected player immersion and enjoyment are expected to have been resolved for the large-scale studies that have been planned with the beta game versions.

In terms of the research questions explored, results from the three different games tested highlight that games on serious and sad topics can be enjoyable (R1). In particular, the results of the GUESS (Figure 11) and GEQ (Figure 12) questionnaires across all three studies revealed positive overall experiences. Ratings were consistently high for narrative quality and audio aesthetics, while visual aesthetics were also generally high for all games, but with variations. The above findings strongly indicate that immersive storytelling and compelling aesthetics had an impact on positive player experiences, despite the games' gloomy subject matter.

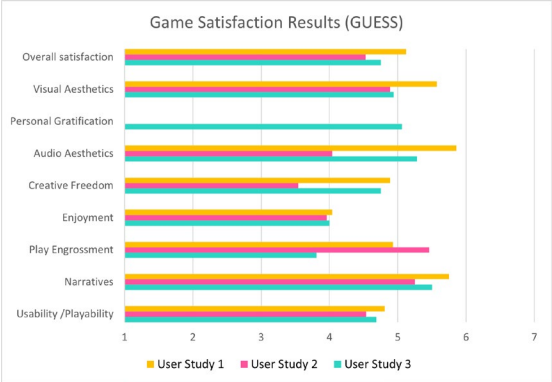

Figure 11: *Combined results from the Game Satisfaction questionnaires for all studies*

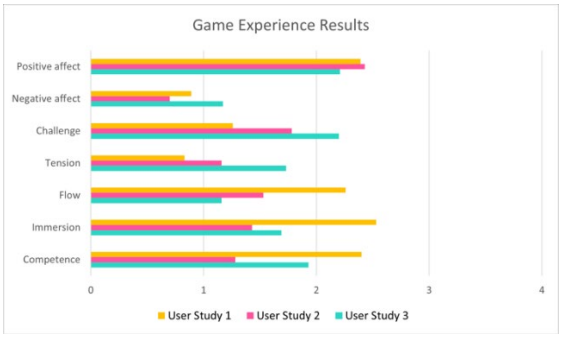

Figure 12: *Combined results from the Game Experience questionnaires for all studies*

Qualitative data from the interviews further support these findings. Across all three games, participants stressed the importance of the narrative in maintaining their interest and intention to continue engaging with the game and playing its final version. In *We Grew Up in War*, players found the game to be "good", "enjoyable" and "interesting", with particular attachment to the characters' stories. In *Those from Below*, participants appreciated the opportunity to learn about miners' lives through an immersive VR experience. In *Gulag Diaries*, players appreciated the historical storyline and would like to play the game again.

One aspect worth exploring refers to the factors that influence enjoyment (R2), which may be different than those in typical gaming contexts, especially considering that the corresponding score was positive but modest across all games. Particularly in the case of the impact of war on children, the high standard deviation suggests variability across participants' perceptions, which may stem from personal sensitivities to the game topic, but also from different expectations on game mechanics and challenge. The sadness of the topic did not seem to constitute a detracting factor for enjoyment based on interview results. For example, in *We Grew Up in War*, players pointed out the topic sadness but maintained their appreciation for its narrative power. "The game is sad but nice" was stated, suggesting a coexistence of emotional intensity and enjoyment and the impact of meaningful engagement on enjoyment [BoMO15]. Obviously, technical and usability issues emerged as significant mediators of enjoyment, with persistent problems having a considerable impact on the overall experience, by increasing tension and decreasing flow and immersion, as evidenced by GEQ results. Moreover, it is notable that although challenge levels were moderate to low, they did not have an impact on positive affect ($r(43)=.025$, $p=.98$). This suggests that game immersion, user flow, and overall positive experience are not driven by gameplay challenge, but rather by the storyline and plot.

Overall, based on the above, the conducted studies attest that serious games featuring sad and serious topics can be enjoyable, provided that they ensure a strong narrative, emotional engagement, and adequate usability. Therefore, enjoyment is not equivalent to fun or excitement, but is affected by meaningful immersion and emotional involvement, with key factors being the storyline, visual and audio aesthetics, and the absence of technical barriers.

Individual player characteristics and their impact on game satisfaction are also worth exploring. In this direction, the potential impact of gender (R3), expertise in playing games (R4) and expertise with the gaming device (R5) were explored on GUESS (Table 1) and GEQ (Table 2) scores. Participants' responses were studied regarding the impact of gender, with 19 male and 25 female participants (responses from 1 participant who indicated their gender as "Other" were not included in this analysis). Regarding gaming expertise, participants who indicated that they typically play games less than 5 hours per week were classified as "non-gamers" (31 participants), whereas all others as having expertise with games (14 participants). For their expertise with the testing device, participants who indicated that they have never or rarely used the device employed for the testing (tablet, VR, and PC correspondingly) were classified as non-experts (9 participants). An independent samples t-test was performed to compare overall GUESS and GEQ scores between the different participants groups. Where sample homogeneity of variances was violated, Welch's correction was applied.

Table 1: *Results of t-tests for the impact of gender, gaming expertise, and device expertise on GUESS scores*

	Gender	Gaming	Device
Overall	.701	.096	***.027**
Visuals	.573	.738	.357
Audio	.317	.146	.065
Freedom	.512	.346	.315
Enjoyment	.211	***.012**	.594
Engrossment	.941	.475	0.745
Narratives	.710	.624	.096
Usability	.401	.126	***.014**

Results regarding user satisfaction indicate that gender is not a moderating factor, while gaming expertise and device expertise can have an impact on user satisfaction. In particular, a statistically significant difference in enjoyment scores between the two groups, $t(43) = -2.64$, $p = .012$. Gamers reported higher enjoyment ($M = 4.39$, $SD = 0.78$) compared to non-gamers ($M = 3.82$, $SD = 0.31$). This suggests that prior gaming experience may positively influence the perceived enjoyment of the game, particularly in the case of serious game prototypes. In addition, the overall satisfaction ($t(43) = -2.29$, $p = .027$) and perceived game usability ($t(43) = -2.56$, $p = .014$) turned out to be moderated by experience with the gaming device. Participants who were experienced with the gaming device reported higher perceived usability ($M = 4.89$, $SD = 1.71$)

compared to non-experts (M = 3.67, SD = 1.31). Similarly, experts reported higher overall satisfaction (M = 4.89, SD = 0.41) against non-experts (M = 4.33, SD = 0.50). These findings suggest that players who are more experienced with gaming devices tend to be less affected by usability issues, managing to develop mitigation strategies and therefore feel more satisfied with the game.

Table 2: *Results of t-tests for the impact of gender, gaming expertise, and device expertise on GEQ scores*

	Gender	Gaming	Device
Positive affect	.491	.772	.568
Negative affect	.568	.314	***.0002**
Challenges	***.052**	.751	.464
Tension	***.041**	.879	***.041**
Flow	***.036**	.236	.119
Immersion	.738	.290	.304
Competence	.947	.139	***.020**

Results regarding game experience reveal some interesting differences regarding user attributes and their influence on perceived experience. Gaming expertise did not turn out to be a moderating factor, whereas gender and device expertise did. In particular, a statistically significant difference in engagement with the game regarding flow, tension, and challenges was observed between genders. Male participants reported experiencing higher flow (M = 2.47, SD = 0.79) in comparison to female participants (M = 1.84, SD = 1.03), t(42) = 2.16, p = .036. In addition, they experienced higher tension (M = 0.93, SD = 0.69) than female participants (M = 0.44, SD = 0.51), t(42) = 2.16, p = .041. Finally, they reported higher challenge (M = 1.91, SD = 0.61) than female players (M = 1.43, SD = 0.66), t(42) = 1.99, p = .052. Regarding device expertise, users familiar with the gaming device reported higher competence (M = 2.04, SD = 0.82) in comparison to inexperienced participants (M = 1.24, SD = 0.66), t(43) = -2.40, p = .020. Moreover, they reported higher tension (M = 0.74, SD = 0.69) than players with a lack of device expertise (M = 0.30, SD = 0.21), t(43) = -2.17, p = .041. Finally, they reported higher negative affect (M = 0.83, SD = 0.46) compared to non-experts (M = 0.25, SD = 0.06), t(43) = -4.10, p = .0002.

These findings, in comparison to the factors that moderate user satisfaction, provide further insights. Specifically, while both male and female players may have rated the games similarly in terms of enjoyment and satisfaction, their engagement differed. Male players appear to have felt more engaged with the games but also experienced a greater burden, caused either by the game narrative or the usability issues encountered. Female players, while still positively engaged, reported lower scores across flow, tension, and challenge dimensions, reflecting either a different stance towards the serious games, more tolerance towards the usability issues that emerged, or both. Furthermore, device expertise emerged as a relevant moderating factor in both game experience and game satisfaction. Players more familiar with the gaming platform reported increased tension, while their higher satisfaction – especially in Narratives and Audio Aesthetics – suggests deeper engagement with the game's content. Although Enjoyment remained moderate across studies, qualitative data further supports this interpretation: experienced users often commented on the games' story, themes, and atmosphere. These findings indicate that satisfaction likely stemmed from narrative and sensory immersion rather than ease of interaction or superficial enjoyment. Accordingly, less experienced users reported lower competence, lower tension and negative affect, and lower overall user satisfaction. In addition to findings about the impact of serious games on different categories of players, it is also important to underscore the value of combining different evaluative instruments. While GUESS is well suited for assessing players' subjective impressions and satisfaction parameters, GEQ captures the emotional and cognitive variabilities that arise during gameplay.

Overall, based on the user-based studies of three serious games on complex and emotionally charged topics conducted with 45 participants, it is confirmed that such games can be engaging and enjoyable. Results underpin that enjoyment is not necessarily linked to traditional elements such as fun or challenge, but rather to narrative strength, powerful audio and video aesthetics, and emotional resonance. Moreover, individual characteristics of player personalities – including gender, gaming expertise, and device expertise – moderate user satisfaction and game experience. Finally, a multi-instrument approach to the evaluation of game experiences can support a comprehensive understanding of user interaction and experience, unfolding different perspectives, which combined can lead to valuable insights.

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