Usability Analysis of a Collective Digital Memorial System: Between Technique and Emotion

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Abstract. Introduction: *Although digital memorials have been discussed conceptually for over a decade, there remains scant evidence on the user experience of collective digital memorials, platforms where honorees share a common bond.* ***Objective:*** *To fill this gap by conducting a mixed-methods usability evaluation of a web-based collective memorial.* ***Methodology:*** *Eight participants, varied in age, gender, and technical familiarity, completed representative tasks while their interactions were recorded via screen capture, think-aloud protocol, and pre- and post-test questionnaires.* ***Results:*** *Analysis uncovered recurring challenges in onboarding, feedback, and cultural representativeness that critically shape the user experience. Based on these findings, three grief-oriented heuristics are proposed to extend Nielsen's usability principles with considerations specific to posthumous memory. All data and a replication package are publicly available to support further research.*

Keywords *Digital Legacy, Death, Usability, Digital Memorial, Collective, Analysis*

1. Introduction

The increasing digitization and expansion of online environments have radically transformed the ways in which personal and collective memories are recorded, shared, and preserved [Trevisan et al. 2021]. In this scenario, digital memorials emerge as possible tools for maintaining the legacy of individuals and communities, enabling not only the storage of information but also the promotion of interactions through tributes, narratives, and multimedia records [Brubaker et al. 2014, Lopes et al. 2014].

Although numerous studies have explored the theoretical and design dimensions of digital memorials [Monteiro et al. 2024; Lopes et al. 2014], in this research, only three publications focusing on collective digital memorials were identified [Ueda and Maciel 2021; Ueda et al. 2022; Monteiro et al. 2024], and empirical validation of these interfaces remains lacking.

Consequently, empirical evidence is still missing on which parts of the interaction help or hinder the experience in collective digital memorials and how those

insights can be turned into concrete design guidance. This need for evidence motivates our research question: Which usability issues and emotional-cultural needs emerge when people interact with a collective digital memorial, and how can these findings be consolidated into grief-oriented design heuristics?

To investigate this research problem, we conducted a mixed-methods usability study [Creswell and Creswell 2022] that combined screen recordings, think-aloud protocols, and post-test surveys with participants of diverse ages, genders, and technological backgrounds. The study also aligns with GC4 (Sociocultural Aspects in Human-Computer Interaction) of the GranDIHC-BR 2025-2035 agenda, which calls for research that foregrounds cultural diversity and mourning practices in interactive systems [Pereira et al. 2024]. From the evidence gathered, we deliver three main contributions: a public usability dataset that other researchers can mine; a small set of heuristics - Empathic Feedback, Cultural Representativeness, and Privacy Transparency - that add grief-specific considerations to Nielsen's classic usability principles [Nielsen 1994]; and an open replication package.

This study is part of the research project conducted by the Dados Além da Vida [DAVI 2025] group, whose primary objective is to deepen investigations into digital legacy and to propose improvements and solutions in computer systems engineering, thereby empowering heirs to protect digital assets in accordance with the expressed wishes of deceased users.

This article is organized as follows: Section 2 presents the theoretical foundations of the paper; Section 3 gives an overview of the system; Section 4 describes the methodology and evaluation protocol; Section 5 discusses the results, lessons learned, and design recommendations; and finally, Section 6 presents the final remarks.

2. Related Work

This section adopts a literature review: it gathers and synthesizes relevant articles, without necessarily applying strict search or quality-assessment criteria, focusing instead on the conceptual discussion [Grant and Booth 2009].

Digital memorials extend traditional physical memorials such as public monuments or cemetery headstones, whether individual or collective, into online platforms for tributes, remembrance, and mourning. As [Castro et al. 2018] document, cemeteries have evolved over time from churchyards to park cemeteries, vertical cemeteries, and crematoria, and with technological advances, these places have gradually moved into digital spaces through online memorial services.

Previous studies have highlighted that digital memorials can assume different formats and purposes, ranging from personal standalone services dedicated exclusively to commemoration, through features embedded in larger platforms such as social networks, to mobile applications that support mortuary tourism with QR code interactions [Lopes et al. 2014; Trevisan et al. 2021]. According to [Ueda and Maciel 2021], collective digital memorials are platforms that honor groups of individuals united by a shared event or identity, and [Ueda et al. 2022] further specify this category to include both dedicated websites hosting multiple honoree profiles and integrated social media memorials such as the Memorial to the Victims of Coronavirus in Brazil, where each profile contributes to a broader collective narrative of remembrance. These collective platforms must balance multiple narratives, respect diverse mourning practices, and provide empathic yet privacy-sensitive interactions.

Despite these foundational contributions, empirical evaluation of collective digital memorials remains underdeveloped. [Ueda and Maciel 2021] conducted a bibliographic survey of Brazilian HCI works to systematize design recommendations covering technical, legal, and cultural dimensions of digital memorial services. [Ueda et al. 2022] expanded on this by synthesizing published studies to analyze the design characteristics, structural elements, and cultural relevance required for different memorial platforms. [Monteiro et al. 2024] prototyped a collective digital memorial system by developing context models, requirement specifications, and interactive prototypes, which were refined through focus group discussions and questionnaire feedback. However, none of these studies provides a public usability dataset or empirically validates design heuristics for collective memorial interfaces, a gap that the present study addresses.

At the same time, scholars emphasize that memorial systems must reconcile cultural diversity, privacy expectations, and the emotional weight of mourning [Neris et al. 2024; Maciel 2021; Ferreira et al. 2021]. The ongoing digitization of personal data and the projected growth of deceased users' social-media profiles [Öhman and Watson 2019] further complicate data governance and ethical considerations, underscoring the need for empirical evidence to guide design decisions in this sensitive domain.

Usability testing and interaction analysis effectively reveal interaction problems, accessibility barriers, and emotional friction in applications [Barbosa et al. 2024]. Yet evaluations of this kind are still scarce for collective digital memorials, suggesting the field would benefit from additional empirical studies that combine both quantitative and qualitative evidence.

Combined, these theoretical advances reinforce that usability is a critical factor in the implementation of collective digital memorials. The user experience must balance a wealth of functionalities - including the storage of photos, videos, messages, and other tribute formats - with an interaction design that is secure, clear, and empathetic, while respecting cultural variability and the sensitive nature of the subject [Monteiro et al. 2024, Lopes et al. 2014, Barbosa et al. 2024]. The adoption of iterative development methods, which include successive testing phases, becomes fundamental to aligning the application with the expectations of its diverse users, as well as incorporating new technical and legal requirements that may emerge over time [Lopes et al. 2014, Ferreira et al. 2021].

3. Methodology

The present work is framed as applied research with a qualitative approach, as discussed by [Creswell and Creswell 2022], and is guided by principles of iterative development inspired by [Barbosa et al. 2024]. The initial design of the collective digital memorial system, as well as its prototypes, was based on theoretical and empirical recommendations presented in previous studies [Monteiro et al. 2024]. Building on this foundation, the application was gradually refined so that the focus of this work is essentially on evaluating the system with real users, aiming to investigate the system's usability and its alignment with participants' needs.

To conduct the usability tests, the inquiry method was adopted, as proposed by [Barbosa et al. 2024]. This method involves collecting data through surveys and the analysis of user opinions. In this context, the following artifacts were created:

1. A pre-test survey designed to collect participants' profile data (age range, previous experience with digital memorials, and technological familiarity);

2. A test task protocol simulating use scenarios of the system, including account creation, insertion, and editing of memorials, navigation through existing records, and interaction via tributes;
3. A post-test survey that investigated perceptions on navigability, usability, accessibility, and overall satisfaction with the application.

Before the main study, a pilot test with one participant was conducted to verify the task flow and wording of the instruments. All pre- and post-test questionnaires were administered via Google Forms, and every session was recorded via screen capture.

To ensure methodological transparency, the task protocol and the detailed instructions for conducting the tests were made available in a repository for consultation. The recruitment of participants sought to encompass a diversity of profiles, totaling eight individuals who voluntarily agreed to participate in the study. This attention to age, gender, and cultural variety follows the guidance of GC4 (Sociocultural Aspects in Human Computer Interaction) in the GranDIHC BR agenda for 2025 to 2035, which recommends that empirical HCI research explicitly account for sociocultural plurality [Neris et al. 2024].

The usability sessions were held in a quiet room at the Institute of Computing of the Federal University of Mato Grosso (UFMT), with only the participant and an examiner present. The examiner, an undergraduate student with more than three years of experience in research on digital memorials, was available to answer technical questions but did not guide user decisions. Each participant completed the pre-test survey, performed the tasks, and filled in the post-test survey on the same 16-inch laptop (1920 × 1200 px) using an external mouse and an external microphone. While the participant worked on the post-test survey, the examiner left the room to avoid exerting any influence and returned at the end to close the session.

During the pre-test and the execution of the planned tasks, the examiner was present to monitor the activities, recording both objective quantitative metrics (task completion time, error count) and qualitative observations (hesitations, verbal comments) at key interaction points such as image upload and tribute submission. We also administered structured pre-test and post-test surveys: the pre-test survey gathered demographic information and self-assessed technological familiarity, while the post-test survey combined Likert-scale items (navigability, feedback clarity, satisfaction) with open-ended questions to capture emotional and cultural nuances.

The analysis of the results thus followed a mixed-methods design [Creswell and Creswell 2022]. The quantitative dimension encompassed metrics such as average task duration and frequency of errors or uncertainties, whereas the qualitative dimension focused on emotional reactions (e.g., affective responses to tributes) and functional feedback (e.g., clarity in navigation and adequacy of system messages). This combined approach is particularly well suited to applications like collective digital memorials, where both cultural context and emotional engagement are central.

Throughout the process, the adoption of an iterative cycle (see Figure 1), fully supported by empirical data, can be repeated as many times as necessary; each new round would validate improvements and further adapt the memorial to users' needs and expectations. Therefore, the methodology reinforced the development trajectory outlined in previous works, emphasizing user testing as an essential step in enhancing technological solutions for collective digital memorials.

It is worth noting that the initial development of the test protocol was supported by an artificial intelligence tool, which was also used to translate the text of the article into English and then manually revised by the authors.

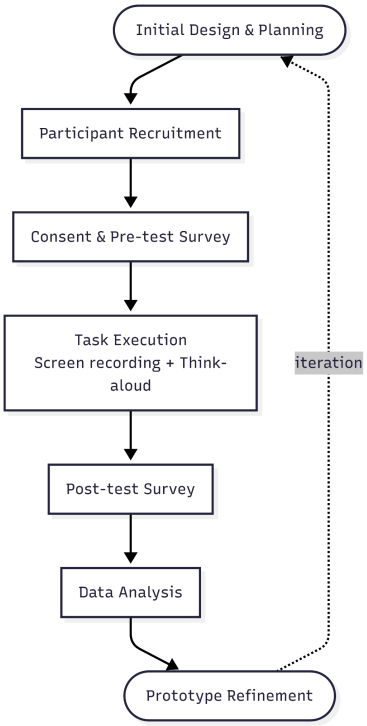

Figure 1. Method overview for the usability study.

3.1. System Overview

The evaluated application was built for adults with varying levels of technological familiarity who are interested in creating online memorials. It is a web-based collective digital memorial platform built on .NET 5.0, with a back-end in C# and ASP.NET MVC and a front-end using HTML5, CSS3, and JavaScript [World Wide Web Consortium (W3C) 2014, World Wide Web Consortium (W3C) 2021, Ecma International 2020]. All persistent data, such as user credentials, memorial records, and media references, is stored in a Microsoft SQL Server database accessed via Entity Framework Core [Microsoft Corporation 2020]. User authentication and management are handled by ASP.NET Identity.

After logging in, authenticated users can create, edit, or delete the memorials they authored. Each memorial includes the honoree's name, date of birth, date of death, a rich-text biography, and optional thematic tags (for example, career, religion, or hobbies). In the media module, users can upload images and videos by selecting files; these uploads are stored on the server.

Only authenticated users can leave tributes, which may contain text, images, or emojis. In the privacy settings, the memorial creator defines whether these tributes are visible to the public or only to specific user groups.

The homepage displays the most recent memorial cards in a paginated format and provides a keyword search field. When accessing a memorial, users see the

honoree's biography, the media section with uploaded images and videos, and then the tributes area, where multimedia comments and tributes appear in chronological order.

Throughout the interface, quick notifications confirm successful operations, such as "Memorial created successfully" or "Tribute posted".

Figure 2 gathers the four main interfaces of the system, numbered from 1 to 4, as described below.

1. Homepage: This is the first screen the user sees when accessing the site. It provides shortcuts to create a new memorial, browse existing memorials, and access the user profile, and it displays a summary of the most recent memorials.
2. Memorial List: on this screen, the user can view and search all registered memorials. A prominent search bar and cards showing the honoree's name and date of death allow quick access to the desired record.
3. Memorial View: when entering a memorial, the user finds the full biography, dates of birth and death, a photo gallery, and the tributes section, where family and friends can leave comments and messages of remembrance.
4. Memorial Creation Form: In this interface, the user fills out a step-by-step form to register a new memorial. Fields are provided for name, dates, image upload, and thematic category selection, along with buttons to save and review before publishing.

For more details on architecture, see [Monteiro et al. 2024].

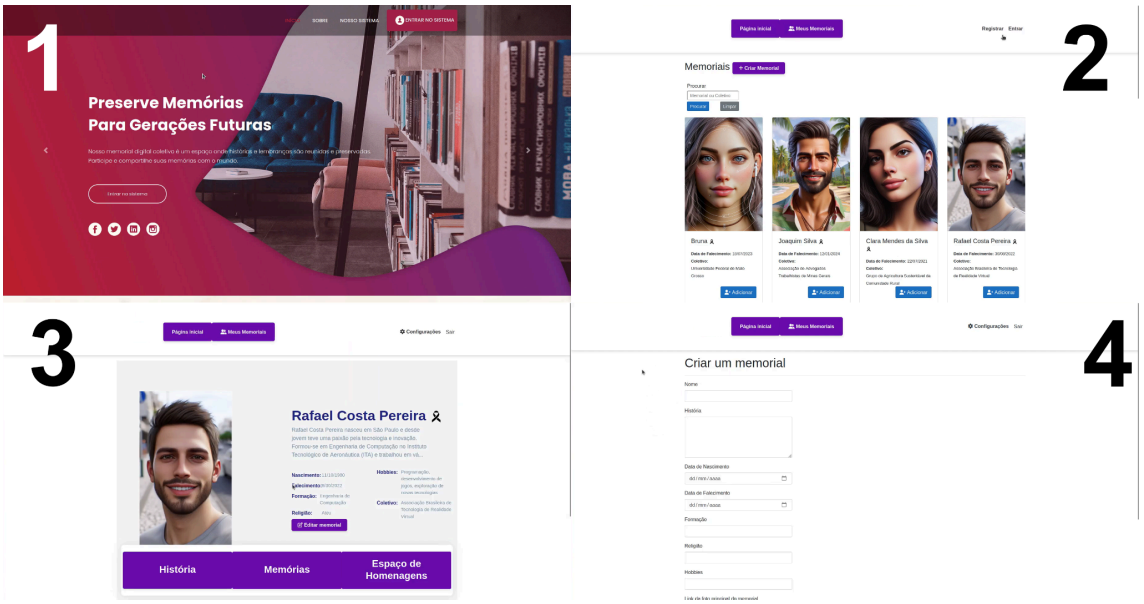

Figure 2. Overview of the main interfaces: (1) Homepage; (2) Memorial List; (3) Memorial View; (4) Memorial Creation Form.

3.2. Ethical Considerations in Research

The project adheres to the ethical standards of the responsible institution and was approved by the UFMT Research Ethics Committee under number CAAE 64403416.6.0000.5690. Each participant was instructed to read the Free and Informed Consent Form and, if in agreement, to accept its terms.

4. Results

In this section, the main findings from the usability tests applied to the collective digital memorial are presented, highlighting both the information regarding the participants' profiles and the perceptions, difficulties, and suggestions raised throughout the proposed tasks. The full pre-test and post-test survey questions and responses generated in this study are included in the anonymous replication package [Artifact 2025]. Initially, the context and preparation of the participants (pre-test) are described, followed by an analysis of the actual execution of the tasks and the feedback from the post-test. Finally, a synthesis of the overall impressions about the system is provided, highlighting aspects that functioned satisfactorily as well as opportunities for improvement identified.

4.1. Pre-test Data and Participant Profile

This section presents general information about the profile of the participants. These data help to understand the demographic context of the group, as well as their level of engagement with the digital realm and the subject of the study.

4.1.1. Basic Participant Profile

Table 1 describes the overall profile of the participants, including the year of birth, gender, and average time spent on the internet on a daily basis. This overview provides context regarding each individual's involvement with the digital world, suggesting variations in use intensity and potential differences in familiarity with online applications. Each participant is identified by the letter P followed by an Arabic numeral.

Table 1. Basic Profile of the Participants.

Participant	Birth Year	Gender	Internet Use (h/day)
P1	1980	Female	>12 hours
P2	1970	Female	9-12 hours
P3	1981	Female	9-12 hours
P4	1979	Female	9-12 hours
P5	2000	Non-Binary	1-4 hours
P6	2003	Female	9-12 hours
P7	2003	Male	>12 hours
P8	2002	Male	9-12 hours

The data show that intensive internet use (between 9 and 12 hours daily or more) is predominant among six of the eight participants. The group's average age is approximately 34 years, ranging from 21 to 54, and most participants identify as female (five participants), followed by two males and one non-binary individual. Notably, P5 exhibits a more moderate use (1–4 hours daily), which demonstrates considerable variation in the time dedicated to online activities. This factor may influence, to varying degrees, the familiarity with the interface and the learning curve associated with digital memorial systems.

4.1.2. Social Media and Memory Recording

Table 2 shows the social media platforms most used by the participants and the medium in which they had previously recorded their memories, such as paper, diaries, digital files, online platforms, etc.

Table 2. Most Used Social Media Platforms and Media for Memory Recording

Participant	Most Used Social Networks	Have You Recorded Your Memories? If Yes, Where?
P1	Facebook, WhatsApp, Instagram, TikTok	Paper, diary, .doc files, Facebook, Insta-gram, websites
P2	Facebook, WhatsApp, Instagram, Telegram	Paper, .doc files, Facebook, Instagram, apps, websites
P3	WhatsApp, Instagram	.doc files
P4	Facebook, WhatsApp, Instagram	Thesis projects
P5	WhatsApp, Instagram, Telegram	Paper, diary, .doc files, X/Twitter
P6	WhatsApp, Instagram	Paper, diary, Facebook, X/Twitter, Instagram, apps, websites
P7	WhatsApp, Instagram, LinkedIn	.doc files
P8	Facebook, WhatsApp, Instagram	.doc files

Most participants resort to platforms such as WhatsApp, Instagram, and Facebook for part of their daily interactions. Although recording memories on social media is frequent, the intent may differ from what is expected of true digital memorials, which are generally aimed at preserving posthumous memories or creating collective repositories. On the other hand, some social media platforms offer the possibility to "memorialize" the profiles of deceased users, bringing everyday use experiences closer to a form of posthumous record and perpetuating the memory of the individual. Some participants (P5 and P6, for example) also mentioned the use of diaries or paper for recording memories, suggesting a more intimate documentation practice. These data indicate that, for some users, the idea of a digital memorial aligns with existing practices of "preserving narratives," which can be more public, as on online platforms, or more private, as in offline archives and analog media.

4.1.3. Opinions and Knowledge about Digital Memorials

To better understand the participants' perceptions regarding the creation and use of digital memorials, the data were organized into two distinct tables. Tables 3 and 4 present the responses collected during the pre-test. Table 3 provides general information on how users evaluated the importance of creating a digital memorial. In contrast, Table 4 focuses on individual preferences concerning the public sharing of personal records, thus highlighting the different privacy settings desired. This division enables the identification of both general trends and the specific needs and expectations of each user, facilitating the proposal of improvements in the system's interface and functionality.

Table 3. Relevance of Creating a Digital Memorial

Participant	Have You Created a Digital Memorial?	Do You Think It Is Important to Record Your Memories?	Justification
P1	No	No	Fear of judgment
P2	No	Yes	Life's trajectory does not end with death
P3	No	Yes	Others can get to know their story
P4	No	Yes	Record for family and friends
P5	Yes	Yes	Others can see their ideas and thoughts
P6	No	Yes	Friends and family can access memories
P7	No	No	Does not see the need for it
P8	No	No	Does not see experiences that justify it

Although most participants had never used a specific tool to create a digital memorial, many acknowledged the importance of recording their memories, justifying this by the need to perpetuate personal trajectories and allow others to learn about their stories: "It feels as if it eternalises a person's path" (P2). On the other hand, some participants expressed concerns with being overexposed, or believed that their experiences do not justify such a record. This diversity of opinions highlights the need for flexible and adaptable approaches to accommodate different users' perspectives.

The following table 4 highlights the individual preferences of the participants regarding who they would like to have access to their memory records, showcasing the various privacy settings desired.

A cross-analysis of Tables 3 and 4 reveals some interesting nuances. For example, P7 and P8 indicated that they did not see the need to create a memorial (Table 3), yet they defined specific groups of people who should have access to their records (Table 4). This suggests a possible contradiction or, at the very least, a partial openness to the idea of sharing memories, even if they initially claim that a posthumous record is not relevant. In contrast, P1 remains consistent by not only stating a lack of interest in creating a memorial but also by opting not to grant access to their data to anyone. These behaviors reinforce the idea that privacy settings need to be flexible and adaptable, allowing users to decide on different levels of sharing their stories, even in the face of a potential change in perspective over time.

Table 4. Privacy Preferences in Digital Memorials

P.	Nobody	Parents or Guardians	Relatives	Relatives	Friends	Colleagues	Interested Parties
P1	X						
P2				X	X	X	X
P3		X	X	X	X	X	X
P4			X	X	X	X	

P5		X	X		X	X	X
P6		X	X	X	X	X	X
P7		X	X	X	X	X	X
P8		X					

4.2. Test Execution

Each of the eight participants was invited to perform, in a face-to-face and individual setting, a set of tasks simulating real use of the collective digital memorial. After a brief recap of the instructions on creating an account, inserting and editing a memorial, navigating through existing records, and leaving tributes, the volunteers were asked to perform those same tasks. During this process, the completion time and the occurrence of any errors were recorded.

Table 5 displays the total time spent by each participant on all tasks. Although there is significant variation, it is observed that most participants completed the protocol in between 15 and 35 minutes, a result that reflects both different navigation paces and how detailed the texts and tributes written by the participants are.

During this process, any questions or difficulties in locating resources (for example, when attaching photos or editing data) were noted. Upon completing all tasks, each participant filled out a post-test survey.

Table 5. Total Time Spent on Task Execution.

Participant	Total Time
P1	23m31s
P2	33m01s
P3	36m02s
P4	20m16s
P5	14m32s
P6	22m50s
P7	17m54s
P8	16m32s

Despite all participants eventually completing the registration step, five of the eight needed assistance during account creation. In most cases, they confused the “Create Account” form with the “Create Memorial” workflow, trying to enter honouree details in the credential fields, which lengthened the median registration time: “When I was creating a new account, I accidentally clicked Create Memorial” (P1, free translation). This pattern indicates that the current onboarding lacks clear contextual cues. To address it, the interface should visually and textually separate registration from memorial entry (e.g., distinct colour schemes or headers) and display a brief tooltip explaining “What you will do here,” so first-time visitors immediately recognise that they are setting up their own user account rather than a memorial.

4.3. Analysis of Test Tasks

During the execution of the task protocol, each participant had to perform five key actions in the system: (1) creating an account, (2) inserting a new memorial, (3) editing

an existing memorial, (4) navigating through the available memorials, and (5) leaving a tribute.

Creating an Account: All participants completed this step, although some demonstrated uncertainty when defining the password due to the lack of immediate feedback on the password criteria (e.g., minimum length, use of special characters, etc.). Some suggested clearer hints or validation messages, particularly regarding accepted characters and security level.
Inserting a New Memorial: Most participants understood the basic fields for adding name, dates, and a brief bio of the honoree. However, P2 and P4 felt that initial instructions were lacking, which led them to hesitate when uploading images. They suggested a step-by-step guide or more prominent icons for photo uploads, indicating the need for contextual help in the system or a design more directed to 'breadcrumbs.'
Editing an Existing Memorial: All participants performed the editing without difficulties.
Navigating Through Available Memorials: The majority of the volunteers navigated satisfactorily, but additional filters (by themes, dates, or affinities) were suggested. One participant commented that the search bar was not sufficiently visible and that positioning it more centrally or prominently could facilitate its use.
Leaving a Tribute: All participants managed to post comments and/or files. However, P1 and P6 expressed doubts about the privacy settings for the tribute, and P4 and P7 expected a success notification upon completing the submission, highlighting the lack of explicit feedback in this functionality. In addition, one participant raised a concern about post-submission control, suggesting the need for fine-grained delegation of edit rights: “I wondered if someone else could update my record; that would be interesting” (P4).

In summary, the main points of attention include the need for greater clarity in password requirements, a more logical flow for image uploads, the need for contextual help, a more prominent placement of the memorial editing button, and immediate feedback mechanisms when performing important actions.

4.4. Overall System Evaluation (Post-test)

After completing the tasks and filling out the survey, the participants evaluated the system’s usability and commented on the clarity of its sections and the perceived relevance of the tool. Table 6 summarizes these opinions.

Table 6. Overall System Evaluation by Participants.

P.	Usability	Understood the Sections?	System relevance
P1	Very Good	Yes	Relevant
P2	Good	Most	Very Relevant
P3	Very Good	Yes	Very Relevant
P4	Good	Most	Relevant
P5	Fair	Most	Very Relevant
P6	Very Good	Yes	Very Relevant
P7	Very Good	Most	Very Relevant
P8	Very Good	Yes	Relevant

Most participants rated the navigability and usability of the system positively, highlighting that the key functionalities, such as creating a memorial or leaving tributes, are relatively easy to understand and execute.

4.5. Most Interesting Features and System Objective

Table 7 lists the features that participants found most attractive in the application, along with their understanding of the objective of representing users' life stories in a collective digital memorial.

Table 7. Most Appreciated Features and Evoked Feelings.

P.	Features of Interest	Justification	Feelings Experienced During Use
P1	Stories and photos	To better know each person	Sadness, reflection
P2	Reading memorials	It immortalizes the person's trajectory	Calmness, reflection
P3	Leaving a tribute	To retrieve affective moments	Calmness, reflection, reminiscence
P4	Telling a story/tributes	Record and interaction	Calmness, discomfort, reflection
P5	Sharing stories	Connection between people	Calmness, sadness, comfort, reflection
P6	Comments in memorials	To learn about bonds between people	Calmness, reflection
P7	Adding groups	To assist in mourning and posthumous prestige	Calmness, reflection
P8	Commenting on someone's memorial	To record a tribute at any moment	Calmness, reflection

All participants stated that they clearly understood the system's proposal. The features for tributes and sharing stories were repeatedly praised for both the potential emotional connection they foster and the ease of use for those wishing to record something about the honoree. Some of the reported feelings, like calmness, reflection, sadness, discomfort, and even comfort, underscore the taboo nature of the topic, highlighting the importance of interface elements that respect this context. One participant linked her discomfort to the stock images used in the prototypes: "The example images are all of young people; I didn't feel comfortable seeing them, because we naturally expect to see older deceased individuals." (P1). This remark echoes the broader request for culturally and demographically representative visuals discussed in Section 4.10.

4.6. Areas for Improvement, Additional Ideas, and Feelings

In addition to suggesting improvements in the interface (for example, including representations of different cultures/ethnicities in the memorial examples and implementing a filtering system that allows searching for memorials by categories such as date, affinity, or location), the participants highlighted the importance of

customization options. Table 8 gathers these suggestions together with participants' stated intention to use the system.

Table 8. Suggestions for Improvement and Intention to Use.

Participant	Suggestions	Would Use the System?
P1	Increase ethnic diversity, make photo upload clearer, adjust text	Yes
P2	Clarify first access, allow visitor access without login for leaving tributes, include more types of media (videos, audios) in tributes	Yes
P3	Include a timeline of the honoree with key life events	Yes
P4	Make the registration process clearer, provide a clear flow for editing or updating memorial data	Yes
P5	Allow manual or automatic page updates to avoid inconsistencies	Yes
P6	Promote accessibility, allow less strict passwords, enable a chat for the bereaved	Yes
P7	Make the feed more dynamic, allow filtering by groups	Maybe
P8	Send a success notification when adding a memorial, allow tagging of people	Yes

P1 and P5 suggested that more attention be given to cultural diversity (e.g., displaying profiles of people from different age groups, ethnicities, or social groups). They also stated there is a need for examples or instructions in the interface (e.g., practical use cases or mini-tutorials demonstrating how to create tributes). P6 emphasized the need for accessibility tools, and P7 suggested a more segmented feed (e.g., allowing filtering of memorials by date of death, location, or tribute categories). Most participants expressed a willingness to use and recommend the system provided that the suggested improvements are effectively incorporated.

4.7. Perceptions About the Testing Process

Table 9 presents the participants' evaluations of the testing process, including overall satisfaction ("Overall Process Evaluation"), clarity of instructions ("Clarity"), and the examiner's performance ("Mediation"). Among the difficulties reported, P1 mentioned problems when creating an account, P2 noted complications during first access, and P4 described uncertainty when recording the initial information. The remaining participants did not report significant barriers. Overall, the experience was rated positively in all aspects, and all participants stated that they learned something, whether about digital memorials or about the potential applications of this platform.

Table 9. Evaluation of the Testing Process

P.	Overall Process Evaluation	Clarity	Mediation
P1	Very Good	Very Good	Very Good
P2	Very Good	Very Good	Very Good
P3	Very Good	Good	Very Good

P4	Good	Good	Good
P5	Very Good	Very Good	Very Good
P6	Very Good	Very Good	Very Good
P7	Very Good	Very Good	Very Good
P8	Very Good	Very Good	Very Good

The first column, “Overall Process Evaluation,” represents the participant's global satisfaction with the entire testing procedure, considering factors such as time spent, task relevance, and perceived usefulness. The “Clarity” column refers to the clarity of the instructions, the support material (task protocol, questionnaires), and the manner in which the test was introduced to the participants. Finally, “Mediation” is related to the examiner’s performance during the session, assessing whether appropriate guidance was provided, whether doubts were clarified, and whether a welcoming environment was established for the user. The Table shows that both the mediation and the presentation of the test were well received. In addition, all participants stated that they gained some learning, whether about digital memorials or about the potential applications of these platforms.

4.8. Summary of Planned Improvements

The analysis of the usability tests and the feedback provided by the participants revealed several aspects that can be enhanced to make the collective digital memorial system more inclusive, intuitive, and sensitive to the needs of each user. In addition, improvements identified by the researchers, through reflection on the data collected during the observational process throughout the experiment and from the survey responses, were also incorporated.

First, the need to improve the clarity of feedback for performed actions was identified; for example, displaying confirmation messages whenever a participant completes a relevant operation (such as posting tributes or updating the profile). Another issue concerns refining the password validation messages, indicating in real time the required level of complexity and reducing doubts regarding accepted characters or security level.

Regarding navigation and interface design, hesitations when attaching images have led to the proposal of adding tutorials or breadcrumbs, which would guide users step-by-step in creating and editing a memorial, as well as in sharing photos and videos. Furthermore, we intend to reposition the search bar to a more visible location and to provide thematic filters (by date, affinity, or location), thereby facilitating the organization and search for memorials.

Personalization and privacy aspects are also recurrent in the participants’ feedback. They were interested in configuring who should have access to the tributes and the honoree's data, with different levels of visibility (public, restricted to friends, or specific groups). In this regard, the need to offer varied symbolic representations that respect religious or cultural preferences (for example, customized icons or colors) is highlighted. Additionally, they suggested creating a timeline to showcase key moments in the deceased’s life, thereby reinforcing the collective memories among the users involved.

Regarding emotional support, some participants suggested a support chat for the bereaved, which should promote the exchange of experiences and strengthen the

collective dimension of the memorials. They also considered allowing visitors without a login.

In terms of accessibility, the improvements include both the adoption of responsive design for various devices and a review of password requirements, striking a balance between security and ease of use. Although few participants mentioned specific needs in this area, this demand calls for attention to screen readers, video captions, and options for contrast or text size, thereby enhancing inclusion for people with disabilities.

Finally, the integration of export and sharing features is recommended to facilitate file backups or the posting of tributes on external social networks. To reinforce legitimacy and security, the terms of use and digital inheritance settings should be revised in order to address legal and ethical implications related to posthumous matters, as noted by participants who expressed concerns about who would control the data after death.

In summary, the proposed improvements aim to address both functional aspects (clearer feedback, smoother navigation, and contextual assistance) and emotional and cultural dimensions (respect for different beliefs, symbolic representations, and privacy configurations). The adoption of these recommendations is intended not only to address the gaps identified in the tests but also to enhance the overall experience, making the digital memorial more welcoming to the plurality of profiles, expectations, and worldviews associated with this highly sensitive domain.

4.9. Lessons Learned

The mixed-methods evaluation revealed a set of lessons that can guide the redesign of the system and inform other digital-memorial projects.

First, the results show that collective-tribute platforms need immediate, multimodal feedback whenever users perform emotionally charged actions. Five of the eight participants hesitated after posting a tribute because they received no visual or auditory confirmation, which violates the “visibility of system status” heuristic described by [Nielsen 1994]: “After I added a memorial someone else had created, nothing popped up to say it worked; I wasn’t sure it went through” (P8). Toast-style messages [Google 2025], small progress indicators, and a brief confirmation tone would reduce uncertainty and provide emotional reassurance at these sensitive moments.

The second lesson underlines the need for lightweight, contextual onboarding. Five volunteers confused the account-creation form with the memorial-creation form, entering an honouree’s information where the system expected personal credentials. A two-step wizard that displays only the fields required for registration, followed by a separate “Create memorial” button, is likely to prevent this mistake. The suggestion aligns with GenderMag guidelines [Furniss et al. 2019] for providing clear goals to users with low tolerance for ambiguity.

The third lesson concerns sociocultural customization. Several participants asked for icons, color palettes, and examples representing different ages, ethnicities, and religious traditions. This request reinforces the project’s alignment with GC4 of the GranDIHC-BR 2025-2035 agenda [Neris et al. 2024], which focuses on sociocultural aspects of HCI. Offering a neutral default theme with optional cultural overlays avoids alienating minority groups and facilitates future localization.

Methodological reflections were also valuable. Triangulating screen recordings and think-aloud protocols made it possible to identify problems that isolated metrics would not reveal, such as the discomfort some users felt when choosing complex

passwords in this type of system. The literature notes that short testing cycles with four participants detect most critical problems and shorten redesign time [Virzi 1992]; our data support this potential.

Finally, the evaluation highlights the need for heuristics tailored to mourning contexts. Although Nielsen's classic criteria remain useful, they do not fully cover three aspects that emerged in the tests. The first is Empathic Feedback: half of the participants reported discomfort when the system responded in a "cold" manner, confirming findings from affective-computing studies that emphasise the emotional tone of feedback [Cambria and Hussain 2015]. The second is Cultural Representativeness: requests for icons, photos, and examples featuring black individuals, older adults, and varied funeral rites reinforce the literature on culturally responsive design and resonate with GC4 of the GranDIHC-BR agenda [Neris et al. 2024]. The third is Privacy Transparency: recurrent questions about who could view tributes confirm findings from usable-privacy research [Brubaker et al. 2014] and show that clear messages about visibility and digital inheritance are crucial. We therefore propose incorporating these three checks – Empathic Feedback, Cultural Representativeness, and Privacy Transparency – into future inspections of memorial systems, as they address gaps that traditional heuristics and log analysis often leave uncovered.

5. Final Remarks

The execution of empirical usability tests to evaluate the collective digital memorial system demonstrated the value of an iterative development approach based on the systematic collection and analysis of data. Although seven of our eight participants praised the system's usability, the clarity of its functionalities, and the relevance of its purpose, the observations and suggestions for improvement raise several points of attention. Among these, the importance of enhancing accessibility, offering more dynamic visual feedback during critical actions (for example, when submitting tributes or editing data), and providing initial guidance to facilitate first-time access and comprehension of the system stands out.

In general, the integration of granular privacy settings proved essential, given that some users intend to share their memories widely while others prefer to restrict access to family or friends. Additionally, features such as timelines, thematic filters, and other possibilities for social interaction (e.g., chat for the bereaved) emerged as promising functionalities to enhance the user experience and reinforce the emotional support these systems can offer.

The perception of emotional connection generated by the tributes section, as well as the interest in collaborative features, reinforces the potential of digital memorials as elements of social cohesion and as means of valuing the past. However, the debate about the very need for a posthumous legacy, expressed by participants who do not see the relevance in recording their experiences, demonstrates the cultural and subjective complexity involved in the adoption of digital memorials.

Based on these findings, future studies are recommended with groups of greater socioeconomic and cultural heterogeneity, aiming to verify the extent to which the identified preferences and expectations recur in different contexts. Investigating new solutions for accessibility and personalization, as well as exploring artificial intelligence for grouping or recommending similar memorials, constitutes another essential step to enhance the user experience and stimulate engagement with the platform.

Moreover, a more in-depth approach to the legal and ethical aspects related to digital posthumous legacies and data governance may provide greater robustness to the proposed solutions. Although this study did not delve deeply into these issues in Section 5, some participants expressed concerns about data control after death, indicating that such dimensions deserve more attention in subsequent work.

Since the project focused on certain functionalities and interaction scenarios, other technological dimensions were not evaluated with the same level of detail. For example, the system's performance on older mobile devices or full accessibility for audiences with specific special needs was not addressed. The team's plans include conducting evaluations of this implementation version using various approaches presented by [Barbosa et al. 2024], such as the Communicability Evaluation Method, in order to identify communication breakdowns and provide input for the development of an improved version. Future research can investigate these aspects, broadening the scope of analysis.

This investigation was constrained by three factors: (i) a small convenience group of eight participants, which, while diverse in age and Internet use, cannot represent the full spectrum of cultural and socioeconomic backgrounds involved in mourning practices; (ii) the absence of a formal heuristic inspection or acceptance-model lens (e.g.\ Technology Acceptance Model – TAM or Unified Theory of Acceptance and Use of Technology - UTAUT) to complement the usability data collected through mixed methods; and (iii) restricted technological coverage, since performance on low-end mobile devices, full WCAG conformance, and support for rich media (video, audio) were not evaluated.

Building on these limitations, for future studies, we recommend (i) applying Nielsen’s heuristics and developing memorial-specific sub-heuristics, combined with TAM questionnaires, to obtain a more comprehensive UX picture; (ii) recruiting larger groups of socio-culturally heterogeneous participants and conducting longitudinal field trials; (iii) extending tributes to support video, audio and AI-assisted timeline generation while safeguarding privacy; (iv) designing culturally adaptable visual themes and granular privacy controls; and (v) benchmarking the system on low-end mobile hardware to guarantee inclusive performance.

In summary, the study reinforces the idea that the design and implementation of successful digital memorials need a balance between functional and emotional considerations, ensuring that the platform meets the multiple forms of grief expression and the cultural variations surrounding the theme of death. The use of continuous evaluation processes, combined with effective user feedback, emerges as a crucial vector for the evolution of these systems, expanding their potential to serve as meaningful spaces for the preservation and sharing of memories.

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