After the Fire

Virtual Repatriation and Digital Heritage

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Synopsis:

This thesis investigates how digital artifacts—specifically, the Maya codices—can be meaningfully reconnected with the living communities from which they originate. It critiques current virtual repatriation practices for prioritizing access over relational engagement, and explores alternative approaches grounded in participatory design, storytelling, and gamification. Through collaboration with Maya educators and digital activists, the research develops a speculative prototype that reimagines the Madrid Codex as a tool for cultural continuity and situated meaning-making. The thesis contributes to digital heritage and technoanthropology by proposing a relational framework for ethical, community-led engagements with displaced cultural materials.

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Introduction

The digital age has profound implications for education, society, and global affairs (Schmidt and Cohen 2001), fundamentally transforming the ways in which cultural heritage is preserved, accessed, and interpreted. As cultural institutions increasingly adopt digital technologies, a new field—digital heritage—has emerged, focusing on the role of digitization in safeguarding historical artifacts and making them widely available. Digital heritage refers to the application of digital imaging, information technology, and archival techniques to the preservation, documentation, and distribution of cultural heritage materials. It includes digitization projects for libraries, museums, archives, and architectural conservation efforts, leveraging advancements in digital photography, image processing, and database management (Parry 2005).

Advances in digitization have made historical artifacts more accessible to researchers and the public, but they also raise questions about power, ownership, and cultural agency in the digital realm. Among the many historical artifacts that have undergone digitization, the Mayan codices housed in European institutions stand as significant cases. These ancient manuscripts, created by the Maya civilization to document their knowledge, beliefs, and history, have been physically displaced for centuries. This displacement did not just remove physical objects—it also disempowered Maya communities from actively engaging with their own intellectual traditions. While digitization of the materials has perhaps increased their visibility, it has not necessarily restored their connection to the contemporary Maya communities, as digital archives often remain institutionally controlled and detached from the cultural contexts they represent. This raises a central question: *How can digital artifacts be meaningfully reconnected with the living communities from which they originate?*

To approach this question, it is necessary to unpack the assumptions and meanings embedded in each of its terms. Words like artifact, reconnection and community may appear straightforward, but they are conceptually loaded—shaped by histories of colonialism, debates in digital heritage, and differing epistemological standpoints. What follows is a brief clarification of how each term is understood within the context of this thesis.

By digital artifacts, I refer to cultural materials that have been digitized—often by museums, libraries, or archives—and made available in formats such as scans and photos. In this project, the digital artifact in question is the Madrid Codex, one of the few surviving

pre-Hispanic Maya books. But the word ”artifact” is not neutral: it signals a colonial history of extraction and objectification that this research seeks to complicate. I approach the codex not as a static object, but as a potentially relational and pedagogical medium that can live differently depending on how it is engaged.

Following this line of thinking, if ”return” is to give something back, then the term ”reconnect” signals a process rather than a transfer. It implies that something has been severed—not only materially, but epistemically—and asks what it means to restore a relationship. Reconnection is not achieved by merely providing access to digitized materials; rather, it requires creating conditions in which users—particularly from the communities to whom the codices belong—can actively engage in processes of meaning-making. I understand this as involving both *meaning-making efforts*—the interpretive, emotional, and cognitive work individuals undertake—and *meanings made*, the outcomes through which materials become integrated into one's worldview, values, or sense of purpose(Park 2010).

When I use the term “meaningfully reconnected”, I draw on constructivist understandings of meaning-making as a relational, situated, and transformative process (Krauss 2005). To reconnect meaningfully is therefore to support not just the visibility of the codices, but the capacity to interpret, adapt, and live with them in ways that reflect local epistemologies and affective histories. This approach insists that return is not a matter of location, but of relation and resonance.

This emphasis on relation also informs how community is defined in this thesis. Community is understood as a communicative and affective space, constituted through shared meaning-making, mutual recognition, and collective imagination (Delanty 2018). It is not a return to a nostalgic or traditional past, but a continuously reconstructed social bond—one that is shaped by discourse, experience, and the desire for belonging(Delanty 2018). This understanding is particularly important when referring to living Maya communities, whose connections to the codices are not defined solely by ancestry or location, but by their ongoing engagement with linguistic and cultural practices. In this sense, community is not only who people are, but how they relate, remember, and imagine together.

Finally, origin does not denote a fixed geographic point or a singular cultural identity. It refers to the codex's cultural and epistemological birthplace—the worldview, language, cosmology, and ritual life from which it emerged.

These definitions matter because they expose the limitations of many current approaches to ”virtual repatriation”, a concept that seeks to return cultural artifacts to their source communities in digital form, offers a potential avenue for addressing this disconnection (Hennessy 2009). However, as museums and institutions continue to move towards online collections, many of the current virtual repatriation efforts remain limited to the mere digitization of objects, with little engagement from the descendant communities them-

selves.These initiatives often prioritize institutional agendas—such as expanding digital catalogs or demonstrating a commitment to accessibility—rather than fostering reciprocal relationships with source communities. In many cases, digitized artifacts remain housed within institutional platforms, with little input from Indigenous stakeholders on how they are presented, contextualized, or accessed. These projects, while expanding access, risk replicating colonial models of heritage control, where institutions remain the primary gatekeepers of cultural knowledge.

This thesis explores how participatory and co-design methodologies can be employed to move beyond static digital archives and create meaningful interactions between digital representations of Mayan codices and contemporary Maya cultural practices. Co-design is a collaborative methodology that involves stakeholders— in this case source communities— in shaping the design process. By making design a process where the users are not just the recipients of a designed product but are actively involved in its creation, outcomes reflect the needs and aspirations of those who will ultimately engage with them, thus making them more relevant (Schuler and Namioka 1993).

This thesis focuses on the Madrid Codex due to both its rich content—which includes ritual, calendrical, and divinatory knowledge—and its potential for meaningful digital engagement. By narrowing the scope to this specific codex, the study seeks to make the most of our available resources, knowledge, and time, allowing for a more focused and in-depth analysis of how digital repatriation can bridge the gap between archival collections and living Maya cultural practices. Additionally, we hope this targeted approach may offer insights into how similar methodologies could be applied to other codices or cultural artifacts in the future, expanding the potential impact of this research.By incorporating voices from Mayan communities and fostering collaborations between scholars, digital activists, and leveraging accessible tools for cultural efforts, this research aims to explore new pathways for digital engagement that prioritize cultural agency and co-creation. In doing so, it challenges conventional approaches to digital heritage and seeks to redefine what it means to ”return” an artifact in the digital age.

This study is not just about making ancient manuscripts available online; it is about creating a dialogue between the past and present, between cultural institutions and indigenous communities, and ultimately, about reimagining the role of digital heritage in the process of cultural resurgence and identity formation. Through this lens, virtual repatriation becomes more than a technical solution—it emerges as a means of revitalizing cultural connections that have been fragmented by colonial histories.

This research employs a mixed-methods approach, combining document analysis, archival research, and participatory co-design methodologies to examine the role of digital heritage in the virtual repatriation of Mayan codices.

First, document analysis and archival research will be used to study the structure, themes, and cultural significance of Mayan codices. By analyzing existing digital archives, this

study will identify their limitations and assess how they shape access, interpretation, and engagement with Mayan heritage. Additionally, historical and contemporary narratives of cultural loss and resilience will be examined to contextualize digital repatriation within broader discussions of displacement and cultural continuity.

Second, this study adopts participatory and co-design methodologies to center the perspectives of Maya communities in digital heritage efforts. Through an ethnographic approach, the research engages with Indigenous digital activists and scholars to understand their perspectives on virtual repatriation and digital access. Additionally, an interactive storytelling prototype will be developed through an iterative, collaborative process, ensuring that Mayan voices actively shape the design, narrative, and objectives of the project

Fire serves as a central metaphor and a unifying thread throughout this thesis, symbolizing both destruction and renewal in the context of cultural heritage and digital repatriation. Historically, fire has been a tool of erasure—notably in the burning of Maya texts during colonial conquests, an act that sought to sever Indigenous knowledge systems from future generations. Yet, fire is also a force of transformation, capable of catalyzing rebirth and regeneration. This duality reflects the tensions within digital heritage: while displacement and archival control have long restricted access to Maya cultural artifacts, grassroots efforts and digital methods hold the potential to reignite connections between communities and their heritage. By weaving this metaphor throughout the thesis, I will examine how digital tools, like fire, can be wielded in multiple ways—either to further entrench institutional authority or to empower Maya communities through co-design and cultural agency. Ultimately, fire represents not only what has been lost but also what can be rekindled, making it a powerful lens through which to explore the evolving role of digital heritage in the process of cultural resurgence.

Kindling

This chapter, Kindling, lays the groundwork for the study by providing the necessary background, document analysis, and literature review that will inform the research. Just as kindling is essential to starting a fire, this chapter gathers the foundational materials—historical context, archival insights, and academic perspectives—needed to ignite the discussion on virtual repatriation and co-design. First, it explores the broader historical and cultural landscape in which the Maya codices exist, situating them within narratives of displacement, loss, and resilience. It then turns to document analysis and archival research, examining the Madrid Codex to understand its structure, content, and significance within Maya knowledge systems. Finally, the chapter reviews key literature on digital heritage, virtual repatriation, and participatory methodologies, identifying both challenges and opportunities in current approaches. By assembling these elements, Kindling prepares the conceptual framework that will sustain the research, ensuring that the fire of inquiry is not only sparked but also given the substance to grow.

2.1 Striking the match: Background

The Maya civilization flourished across a vast territory that includes present-day southeastern Mexico, Guatemala, Belize, and parts of Honduras and El Salvador. As one of the most sophisticated and enduring cultures of Mesoamerica, its history spans thousands of years and is usually divided into distinct periods, each marked by significant cultural, political, and social transformations.

According to Morley and Sharer 1994, these periods unfold as follows:

- The Lithic and Archaic periods (before 2000 BCE): This earliest phase saw the gradual transition from nomadic hunter-gatherer societies to settled agricultural communities. The domestication of maize laid the foundation for the emergence of complex societies.
- The Preclassic period (2000 BCE – 250 CE): Monumental architecture, social stratification, and the early use of hieroglyphic writing defined this era. Cities such as Nakbé and El Mirador emerged as major centers of power.

- The Classic period (250–900 CE): Described as ”the height of Maya civilization”, with city-states like Tikal, Copán, and Palenque ruled by divine kings. The period witnessed important advancements in writing, mathematics, astronomy, and political organization. However, by the Terminal Classic (800–900 CE), many cities in the southern lowlands experienced decline, leading to shifts in power toward the northern centers.
- The Postclassic period (900–1500 CE): Marked by political fragmentation and increased trade, this period saw the rise of new centers like Mayapan, which flourished until the Spanish conquest in the 16th century.

After the Postclassic period, the Maya world underwent significant transformations with the arrival of the Spanish colonizers in the 16th century. The decentralized political structure of the Maya civilization, along with resistance to annexation, lead to a prolonged and fragmented conquest that lasted over 150 years (Sharer and Traxler 2006). While Spanish forces gained control of many key Maya cities early on, the last independent Maya kingdom, Tayasal, did not fall until 1697 (Jones 1998). Colonization brought forced labor systems, religious conversion efforts, and the widespread destruction of indigenous texts, yet Maya cultural identity persisted. Throughout the colonial period, Maya communities maintained their languages, religious traditions, and forms of resistance, culminating in large-scale uprisings such as the Caste War of Yucatán (1847–1915), which saw the temporary establishment of an autonomous Maya state (Gabbert 2019). The Maya also played a crucial role in the Guatemalan Civil War, facing violence and displacement while advocating for indigenous rights (Konefal 2010). Far from being a civilization that disappeared, the Maya represent a continuum of resilience, adaptation, and survival, challenging historical narratives of decline and reinforcing their presence in the modern world.

Emerging from the broader Mesoamerican cultural sphere, the Maya civilization distinguished itself through a shared linguistic heritage, monumental architecture, intricate hieroglyphic writing, and advanced calendrical systems (Baudez 2004). Among the world’s most significant writing traditions—alongside cuneiform, Egyptian hieroglyphs, and Chinese characters—the Classic Maya script recorded vast knowledge, from ritual practices to historical chronicles (Iglesia et al. 2021). This knowledge was preserved in screenfold books known as codices, invaluable firsthand accounts of Maya culture and history.

However, this literary tradition suffered near-total annihilation in the 16th century. Spanish colonizers, perceiving the codices as symbols of idolatry and resistance to Christianization, destroyed them in mass burnings. In one of the most devastating acts of cultural destruction in the Americas, missionaries like Diego de Landa ordered the burning of countless Maya books, reducing centuries of accumulated knowledge to ashes (C. George and L. George 2010). Today, only four known codices survive —remnants of a vast, largely erased intellectual tradition. This destruction was not merely the loss of material artifacts but an attempt to erase Indigenous ways of understanding time, history, and the cosmos.

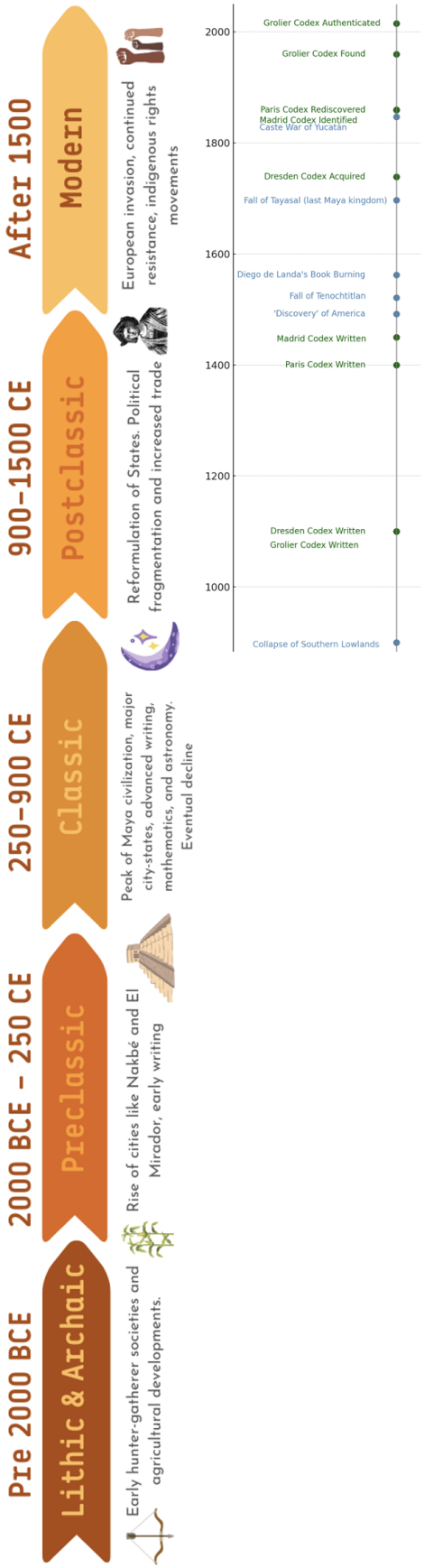

Figure 2.1: Timeline. Historical events are in blue; codices-related dates are in green

Yet, despite these ruptures, Maya knowledge persisted. It remained inscribed on stone monuments, carried forward in oral traditions, and, in recent years, reclaimed through digital repatriation and scholarly collaborations with contemporary Maya communities.

Though the Maya civilization of past centuries has transformed, it is far from extinct—millions of people continue to speak Mayan languages, sustaining a cultural legacy that endures beyond historical narratives of collapse (C. George and L. George 2010). The Maya are not a single, homogenous entity but a diverse and multifaceted culture that has changed and evolved over time. Notably, Mayan is not a single language but rather a linguistic family that has evolved over thousands of years. Today, there are twenty-eight distinct Mayan languages, all of which share a common ancestry but have developed distinctively. Linguistic research indicates that the major Mayan language groups—Greater K'ichean, Mamean, Greater Q'anjob'alan, Tzeltalan-Ch'olan, Yukatekan, and Waxtekan—began to diverge between 2000 BC and AD 100, with further distinctions emerging later during the pre-Columbian era (Morley and Sharer 1994).

This section traces the significance of the codices, the impact of their destruction, and the continual efforts to reconnect with a past that refuses to be fully extinguished.

2.1.1 The Maya Codices and the Written Tradition

Language, as a "uniquely human phenomenon," is intricately linked to culture and cognition (Kasia M Jaszczolt, Katarzyna M Jaszczolt, et al. 2012). As such, linguistic diversity serves as a vital window into the histories, identities, and knowledge systems of communities worldwide. Writing is not merely a tool for communication; it is a foundational mecha-

nism through which societies organize, sustain, and regulate collective knowledge (Starke-Meyerring and Paré 2011).

The Classic Maya writing system, which was used for over 1,500 years (Grube 1994) exemplifies this connection between writing and societal organization. Structurally, Maya hieroglyphic writing is morpho-syllabic, similar to modern Japanese, meaning it contains representations of both morphemes (units of meaning) and syllables (units of sound). The script comprises approximately 2,000 graphemes, including logograms representing entire words and syllabic signs denoting consonant-vowel combinations (Iglesia et al. 2021). Glyphs were arranged in paired columns, read from left to right and top to bottom, forming words and sentences. However, Maya scribes did not strictly adhere to rigid sequencing; hieroglyphs were creatively stylized, combined, and occasionally omitted to enhance visual appeal (ibid.).

Beyond its role as a writing system, Maya hieroglyphs were deeply embedded in artistic iconography. Lama and Rivera (2017) explain that Maya writing was often physically embedded in visual scenes as integral elements of the imagery. Text and image worked together to convey meaning, especially for information that couldn't be easily represented pictorially such as personal names, place-names, and abstract ideas. Embedded texts served to clarify, enhance, or specify elements in the visual narrative, often revealing the identity of characters or locations that would otherwise be visually ambiguous. Many Maya glyphs were highly pictorial, sharing visual similarity with the objects or beings they represented. This iconicity allowed for fluid transitions between image and text. Maya artists used glyphs not only to convey phonetic meaning but also as aesthetic and symbolic decoration. Classic Maya visual culture functioned as a "hard-coded" communication system: structured, specific, and resistant to open interpretation. Unlike modern art, which often embraces ambiguity, Maya art used glyphs and image integration to secure semantic clarity.

Among the most significant artifacts of this tradition were the codices, books made from folded bark paper, which functioned as repositories of knowledge across various domains. These codices were crafted from amate fiber, carefully prepared to create a smooth surface for writing and painting. Their pages were adorned with vibrant hues of red, blue, brown, and black, and some codices even show evidence of deliberate storage and repainting, suggesting that these documents were periodically updated and reused (Carter and Dobereiner 2016). More than static records, the codices served as living documents, preserving cultural memory while being actively engaged with by successive generations.

Today, only four Maya codices are known to have survived, three of which are housed in European institutions and named after the cities where they are kept: the Dresden Codex, the Madrid Codex, and the Paris Codex, all dating to the Postclassic period (Sharer and Traxler 2006). The Dresden Codex, created in the 11th or 12th century, was long regarded as the earliest known book from the Americas (Murray 2009). However, this changed

in 2015 when the Grolier Codex, also known as the Maya Codex of Mexico, was fully authenticated and radiocarbon dated to the 11th century, making it the oldest confirmed surviving Maya manuscript ((Solís et al. 2018). Unlike the other three, the Maya Codex of Mexico is the only one housed in the Americas.

The Dresden, Paris, and Madrid Codices were taken from their places of origin, likely during the early colonial period, and transported across the Atlantic, where they were forgotten, fragmented, or misplaced in European collections for hundreds of years. Their journey saw them reappear eventually not as integral parts of Maya intellectual traditions but as exotic artifacts in foreign archives. Sharer and Traxler 2006 identify the rediscovery of the codices in the public eye as follows:

- The Dresden Codex was acquired in 1739 for the Dresden Library, after being found in a private collection in Vienna. Its earlier history remains uncertain, but it may have been among the Mesoamerican books sent by Hernán Cortés to Emperor Charles V in 1519, as Charles resided in Vienna at the time. Now kept in the Saxon State Library in Dresden, Germany, the codex suffered water damage during World War II but has since been restored.
- The Paris Codex was rediscovered in the Bibliothèque Nationale de France in 1859, where it had been forgotten among old papers in a chimney corner. This codex is in worse condition than the others, with much of its lime coating eroded, leaving only central glyphs and images visible.
- The Madrid Codex, found in Spain in the 1860s, was originally split into two separate parts before being recognized as a single document. One section was published by Brasseur de Bourbourg, while the smaller fragment was acquired by the Museo Arqueológico in Madrid in 1875, where both are now housed. The codex likely arrived in Spain through soldiers under Francisco de Montejo, the Spanish conqueror of Yucatán.

It was only after their rediscovery in the 18th and 19th centuries that they were recognized for their historical and linguistic significance, yet this recognition occurred far from the Maya, reinforcing a legacy of displacement in which indigenous knowledge is valued as an artifact of the past rather than as a living tradition.

It is important to note that the verbs used to describe engagement with the codices, including in figure 2.1, carry with them assumptions about agency, legitimacy, and historical perspective. For example, terms like “acquired” and “found” obscure the colonial dynamics through which these manuscripts entered European collections, often without transparency or consent. “Rediscovered” and “identified” reflect moments when institutions or scholars began to recognize the codices’ significance, but they also imply prior neglect or misclassification. Similarly, the term “authenticated,” used in reference to the Grolier Codex, foregrounds scientific validation but also risks flattening ongoing ethical debates

about provenance and looting. By calling attention to the language used to describe these events, I aim to underscore that the historical narratives surrounding the codices are contested, and that even words can become sites of negotiation.

Functionally, the codices played a multifaceted role in Maya society. They documented historical events, genealogies, and rituals, serving as political instruments that legitimized the power of the ruling elite. At the same time, they were real-time tools for priests and scribes, used to track celestial events, schedule ceremonies, and guide political and religious decision-making (Vail 2006). Some sections recorded planetary movements, eclipse cycles, and seasonal changes, while others provided guidance for divinatory rituals and agricultural planning.

Ultimately, the codices were more than books; they were dynamic artifacts that bridged the realms of astronomy, governance, and artistic expression. As repositories of knowledge, tools for governance, and creative pieces, they encapsulated the intellectual and cultural sophistication of the Maya civilization.

2.1.2 Erasure and violence

Fire has long been both a literal means of destruction and a symbolic instrument of dominance in colonial encounters. Across history, it has served as a tool of protest, survival, destruction, and resistance (Topp 1973). In the Americas, fire played an essential role in indigenous life, from heating homes and cooking food to wood carving, land management, and religious ceremonies (John Carter Brown Library 2024). At the same time, European colonizers wielded fire as a means of control, using it to ”tame” landscapes, mark territory, fuel military confrontations, and exploit resources (ibid.). In this sense, fire functioned as both an important foundation for Indigenous societies and a force harnessed for colonial expansion and domination.

Among the many ways fire has been weaponized, book burnings stand out as a tool of cultural erasure. Although widely recognized in popular imagination through the Nazi book burnings of 1933, the destruction of written texts has long been used as a means to suppress knowledge and enforce ideological control (Fishburn 2008). This was a method used during the Spanish colonization of Mesoamerica in the 16th century in an attempt to Christianize indigenous populations by suppressing their own knowledge and traditions. One of the best known acts of this campaign took place in June 1562, when Diego de Landa, the Franciscan bishop of Yucatán, ordered the burning of those Mayan texts and artifacts he deemed idolatrous.

Beyond material destruction, burning books is a ritualistic act of purification and annihilation, targeting the ideas, histories, and worldviews embodied in the written word (Fishburn 2008). de Landa’s own accounts of the events reflect the broader colonial project of cultural cleansing:

> ”We found a great number of books of their letters, and since they contained nothing that did not contain superstition and falsehoods of the devil, we burned them all, which they felt deeply and caused them great pain” (Landa 1986)

Ironically, de Landa later dedicated years to studying the very culture he helped to decimate. His book, *Relación de las cosas de Yucatán*, is one of the few historical accounts of pre-Columbian Maya customs, language, and beliefs that survive, albeit one filtered through a colonial lens (Restall and Chuchiak iv 2002). This paradox underscores the violence of ”colonial epistemicide”—a process in which Indigenous knowledge is first eradicated, then selectively appropriated and reinterpreted within dominant frameworks (De Sousa Santos 2005).

But the fire, devastating as it was, didn't mark the end of Maya culture. Their books were set ablaze and their beliefs demonized, but when the flames died and the smoke cleared, the Maya were still there.

2.1.3 Survival and resistance

The surviving codices remain a critical source of information on Maya cosmology, religion, and scientific knowledge, serving as tangible connections to pre-Columbian intellectual traditions (Vail 2006). While the visual complexity of Maya script and the omission of phonetic elements pose challenges for modern decipherment (Iglesia et al. 2021), these texts remain invaluable for reconstructing Maya history, language, and epistemology (Grube 1994). Additionally, the Classic Mayan language, largely preserved through modern Ch'olan and Yucatecan languages, enables scholars to link epigraphic inscriptions to linguistics, further bridging the gap between past and present (Wichmann 2006).

The 1562 burning of Maya texts was not merely a historical event, but a continuing struggle over knowledge, memory, and power. The consequences of these book burnings did not end with the loss of physical manuscripts. The destruction of Maya writing systems contributed to the forced imposition of language, religious texts, and ways of knowing. It severed communities from their written past, making historical continuity a challenge and literacy in Indigenous scripts nearly impossible for subsequent generations.

Just from the four remaining ones, we know that the codices contained extensive records of dynastic histories, political events, religious ceremonies, and astronomical observations Vail 2006. The loss of such artifacts contributed to a colonial knowledge hierarchy, where Spanish authorities controlled access to history and literacy. This made it easier to impose Christianity, European legal systems, and economic exploitation by cutting Maya people off from their own intellectual traditions. This destruction of archival records disrupted the ability of future generations to access history, often forcing them to rely on Spanish interpretations of their past. However, this violent attempt at erasure did not result in complete cultural annihilation. Instead, in a way, it strengthened oral traditions as a means

of resistance, allowing Maya communities to preserve their histories, spiritual beliefs, and social structures through storytelling and ritual performance.

Maya orality and performance have historically been intertwined with textual traditions, where glyphic inscriptions—and later, roman script adaptations—functioned as supports for oral storytelling rather than standalone texts (P. Worley 2015). Maya writing wasn't necessarily intended only to be silently read the way we often engage with books today. Rather, one could consider it an element of performance—intended to be read aloud during ceremonies, rituals, or communal gatherings. In the broader context of ancient writing traditions, scripts often supported spoken delivery rather than serving as standalone texts (Houston 1994. In the Maya case specifically, the visual and pictorial qualities of the script helped maintain a degree of legibility for wider audiences, reinforcing its role within collective, performative settings (ibid.)

This dynamic is evident in colonial-era works like the Popol Vuh and the Books of Chilam Balam, which were written in roman script. These texts reflect a stylistic and performative way of telling stories, rooted in oral tradition, seemingly reproducing the experience of a live, communal telling (P. Worley 2015). The forced suppression of glyphic writing transformed oral traditions into a deliberate act of resistance, ensuring that historical continuity persisted outside of colonial control. Rather than signifying cultural decline, this shift was an assertion of autonomy—a means of preserving history, sustaining communal knowledge, and resisting erasure.

The enduring interplay between written word and orality reveals not only the adaptability of Maya knowledge systems, but also their resilience in the face of epistemicide. While the burning of codices attempted to sever historical continuity, Maya communities responded with cultural strategies that preserved memory and meaning beyond the written page. Maya knowledge systems were never extinguished. Instead, they transformed, persisted, and continue to be asserted in contemporary efforts to reclaim, reinterpret, and protect ancestral knowledge.

2.2 Lighting: The Madrid Codex in Focus

This section turns to the Madrid Codex as a critical site of both material and symbolic analysis for this thesis. As one of the few surviving pre-Columbian Maya manuscripts, the codex, beyond a historical artifact, is also an archive of ritual, calendrical, and divinatory knowledge, encoded with distinct ways of seeing, interpreting, and engaging with the world. Known also as the Tro-Cortesianus Codex, it offers a tangible point of access to Maya epistemologies while simultaneously bearing the marks of colonial extraction, displacement, and reinterpretation. Now housed in a European museum and subject to both institutional custody and digital gatekeeping, the codex stands at the intersection of knowledge, memory, and erasure.

The aim of this analysis is twofold: first, to engage with the codex's structure, materiality, and visual language; and second, to raise critical questions about its circulation, ownership, and representation in contemporary digital contexts. Through this focused reading, the section lays the groundwork for reimagining what a participatory, community-centered model of digital repatriation might look like. In this light, the Madrid Codex is not simply a relic of the past, but a living medium whose meanings and potential continue to unfold in relation to the cultural futures of Maya communities.

2.2.1 The Codex as an Object

Made up of 56 sheets painted on both sides for a total of 112 pages, the Madrid Codex is the longest out of the four known surviving codices. Each page measures approximately 22.6 cm in height, and the codex extends over 6 meters when fully unfolded. It follows the screenfold format typical of Mesoamerican manuscripts and is constructed from amate paper, derived from the inner bark of Ficus trees. This support was coated with a calcium carbonate-based stucco layer, which provided a smooth, white ground for painting and writing (Vail and Aveni 2004; Buti et al. 2014).

It is generally believed that the manuscript was sent from to Spain during the Colonial period. By the 19th century, the codex had been divided into two parts, the Codex Troano and the Codex Cortesianus, which were thought to be separate works until Léon de Rosny recognized in the 1880s that they formed a single manuscript when his comparison of what are now known a pages 77 and 78 revealed that they were in fact consecutive (Vail and Aveni 2004). Both sections were acquired by the Museo Arqueológico in Madrid, where the manuscript came to be called the Madrid Codex, and today it is curated by the Museo de América, where it remains under conservation since the museum's founding in 1941 (Vail and Aveni 2004).

One notable feature of the Madrid Codex is the presence of a strip of paper on page 56 bearing writing in Spanish or Latin, which has sparked debates over the years regarding the origin of the Codex. It was once hypothesized that the European paper was embedded withing the original amate and that, thus, the Codex was a post-colonial work, but evidence suggests that it is a paper patch glued on after the manuscript's original creation(Vail and Aveni 2004; Buti et al. 2014). Bricker (2004)likens the patch to a "Band-Aid on a skinned knee," pointing to it as a later intervention and a marker of the codex's evolving material history.

Non-invasive X-ray fluorescence (XRF) analysis identified that the codex was painted using pigments such as hematite for red, goethite for yellow, carbon-based black, and Maya blue(Buti et al. 2014). Maya blue, in particular, has long intrigued scientists due to its remarkable chemical stability, resisting degradation for centuries under tropical conditions, as well as the technological sophistication required for its production as an organic-inorganic hybrid created by binding indigo dye to clay minerals through controlled heat-

ing (Río et al. 2011. Beyond its material properties, Maya blue carried deep cultural and symbolic significance, often associated with ritual offerings and deities (Arnold et al. 2008). The use of this pigment, along with locally sourced materials like amate paper and mineral-based pigments, firmly grounds the codex as an object embedded in a specific cultural, geographical, and historical context, reflective of Maya epistemologies and artistic traditions.

The codex has undergone change throughout its journey. For example, facsimiles from the 1860s still show pictures and glyphs on page 56, while the page was already mostly blank by the early 20th century, likely due to repeated friction while the codex was stored closed (Bricker 2004). Even further back, variations in both artistic style and pigment application across the manuscript point to a collaborative production process, likely involving different individuals or teams working over time (Buti et al. 2014). This temporal layering invites us to view the codex not as a finished, static artifact, but as an object with a life—used, marked, and reinterpreted over time. Its very survival through displacement and fragmentation speaks to its continued meaning and value, even before European scholars designated it a historical artifact.

As Arjun Appadurai (1988) argues, objects have "social lives"; their significance emerges not only from what they are, but from how they circulate, are interpreted, and move through systems of value. The Madrid Codex has moved through many such regimes. It has existed as a ritual tool, a colonial trophy, an archival document, and now, also through digital surrogates—each step of its journey reshaping its legibility, accessibility, and what knowledge it's allowed to convey. That it is known today as the Madrid Codex, named for the European city of its conservation rather than the cultural world of its creation, can itself be considered a symbolic erasure. Yet its material form—built from amate paper, painted with Maya blue, and inscribed by Maya scribes—remains unmistakably local, grounded in the geography, practices, and worldviews of Mesoamerica.

Essentially, the codex is not just a passive witness to these transitions. As Bruno Latour (1996) reminds us, objects participate in social and epistemic networks: they gather actors, provoke responses, and structure relationships. The Madrid Codex has done precisely this—it has animated ties between Indigenous artists and priests, Spanish colonizers and collectors, museum institutions, academic researchers, and recently also digital platforms. It is an active node in a network of knowledge and power, a site where claims of ownership, authenticity, and meaning continue to be negotiated.

Even in entering the digital sphere, the codex undergoes another transformation. Digital reproductions promise broader access, but also risk disembedding the object from its material, performative, and cultural context. As Walter Benjamin (2018) warns, mechanical reproduction can strip objects of their aura—their situatedness in time, space, and ritual. The Madrid Codex in digital form becomes both hyper-visible and fundamentally abstracted, severed from the tactile, ceremonial, and epistemic frameworks that once ani-

mated it. This paradox between accessibility and alienation, visibility and loss, highlights the need to reimagine digital engagement not as reproduction alone, but as a form of relational return that recognizes the codex as a living, contingent, and culturally grounded presence.

2.2.2 Within the Paper: the contents of the codex

If the previous section considered the Madrid Codex as a living object—handled, patched, and transformed across time—this section turns inward, to what lives *within* the paper: the craft of its makers, the knowledge of its people, and the stories that, once painted, pulsed with lives of their own. Beyond the life it has lived as a manuscript, there are worlds that live within its pages.

The content of the surviving Maya codices is organized according to structured calendrical and visual systems, which scholars generally divide into two main formats: tables and almanacs. The difference lays in that tables use dates in the Long Count calendar while almanacs record Tzolk'in dates (Vail and Maya Codices Database Project 2025) Understanding this distinction requires a brief look at the three calendar systems used by the ancient Maya.

Sharer and Taxler (2006) explain that the Maya calendrical system recorded a series of recurring cycles, including the Tzolk'in and the Haab'. The Tzolk'in is a 260-day ritual calendar formed by interweaving 13 numbers with 20 named days, creating a repeating cycle of uniquely charged days. It was used to schedule ceremonies, name individuals, and guide divinatory practices, reflecting a ritual, cyclical understanding of time.

The named days (in Yucatec mayan) are:

- Imix
- Ik'
- Ak'bal
- K'an
- Chikchan
- Kimi
- Manik'
- Lamat
- Muluk
- Ok
- Chuwen
- Eb
- Ben
- Ix
- Men
- Kib
- Kaban
- Etznab
- Kawak
- Ajaw

The cycle begins with the day 1 Imix. Each following day increases by one number and one day-name, so the next is 2 Ik', then 3 Ak'bal, and so on. The numbers go from 1 to 13 in a repeating sequence, while the day-names follow a cycle of 20 unique names, from Imix to Ajaw. Because these two cycles are of different lengths, they interlock in a pattern that produces 260 unique combinations. After the number reaches 13, it resets to 1; after the day-name reaches Ajaw, it returns to Imix. This continues until the full cycle concludes on 13 Ajaw, after which it begins again with 1 Imix. In this way, the calendar moves forward by one number and one day-name each day, generating a complete and non-repeating sequence across the 260-day Tzolk'in.

The Haab', in contrast, is a 365 day calendar, approximating the solar year, composed of 18 months of 20 days plus a final 5 day month known as *Wayeb*. While the Tzolk'in governed spiritual and ritual rhythms, the Haab' was closely tied to seasonal and agricultural cycles.

Together, the Tzolk'in and Haab' calendars form what is known as the Calendar Round—a cycle of 52 years marked by the repetition of the starting Tzolk'in and Haab' day combination. The Tzolk'in has 260 unique day combinations, and the Haab' consists of 365 days, each marked by a month and day number. When these two calendars run simultaneously, they create a larger cycle that only repeats when the least common multiple of 260 and 365 is reached: 18,980 days, or approximately 52 solar years. This means that any specific pairing will recur only once every 52 years.

Additionally, the Long Count calendar recorded the number of days elapsed since a mythological creation date (3114 BCE), allowing the Maya to locate events in absolute, historical time—similar to how modern calendars count from a fixed point such as the birth of Christ. The Long Count is composed of nested units of time, with 13 bak'tuns (approx. 394 years e.a for a total of approx 5,128 years) grouped into Great Cycles. When these calendar system was created, the current Great Cycle had begun on the date corresponding to August 11, 3114 BCE and would end on the date corresponding to December 21, 2012.

The Madrid Codex is composed entirely of almanacs, meaning it contains no Long Count dates that would allow it to be placed within a fixed historical timeline (Vail and Aveni 2004. Instead, it reflects a way of understanding time that is cyclical and ceremonial—attuned to the rhythms of agriculture, the movements of deities, and the interpretation of ritual

practitioners. It was likely used by priests to support ceremonies and divinatory interpretation (Sharer and Traxler 2006) Additionally, parts of the text appear to have been copied or adapted from earlier sources (Sharer and Traxler 2006), suggesting a process of transmission and preservation of ritual knowledge across generations.

Accordingly, the codex centers around ritual and divinatory practices, with the almanacs potentially functioning as interpretive tools, offering guidance for timing ceremonies, interpreting omens, and navigating cycles of creation and renewal (Vail and Aveni 2004). As such, it repeatedly features gods associated with rain, maize, death, time-keeping and celestial movement. These figures are not static throughout the manuscript. They are depicted performing tasks such as burning fires, painting temples, or planting trees—accentuating their active roles in maintaining cosmic order (Vail and Hernández 2013).

The gods are characterized by attributes including headdress type, cranial decoration, coloration, and eye form. Beyond aesthetics, these elements serve to differentiate function, status, and cosmological alignment (Vail 1996). The color red, for example, seems to be associated sacrifice, death, and eastern directionality, while black seems to be linked to warrior status, ritual purity, and have celestial associations with the planet Venus (Vail 1996).

Yet the Madrid Codex does not exist solely in the mythic and ritual sphere. The everyday life of Maya people is visible through almanacs on agriculture, beekeeping, weaving, pottery, and hunting. Nevertheless, even almanacs dealing with apparently secular themes are infused with divine presence (Vail 1996). The agricultural process for example is represented through both anthropomorphic and zoomorphic figures participating in the cultivation cycle, reflecting a deep interdependence between humans, deities, and the land (Morales Damián 2023). In many almanacs, the divine realm mirrors the human: gods enact ritual scripts that were likely emulated by priests, thereby transforming the codex into a manual for ceremonial life (Sharer and Traxler 2006). In this sense, the contents of the Madrid Codex reflect a complex system of ritual knowledge and astronomical observation along with a richly embodied cosmology, where time, nature, the divine, and the human intersect across the painted surface of the manuscript.

Not all anthropomorphic figures are gods. Some are human ritual specialists, captives, or hunters, distinguishable by their lack of divine glyphs or by passive body language (Vail 1996). Morales Damián (2023) argues that the human form in the Madrid Codex is expressive, composed of meaningful parts—faces, hands, feet, and postures—that communicate agency, status, and ritual function. The body is not merely illustrated; it is performed through gesture, costume, and transformation. Figures with prominent eyes, mouths, or hands convey perception and action, while those without these features—often captives or sacrificial victims—are visually marked as lacking agency or ritual power(Morales Damián 2023).

The knowledge contained within the Madrid Codex is layered, embodied, and active. Its

trajectory, similarly, is far from flat. It has moved through hands, institutions, and interpretive regimes; its meaning shaped not only by what it shows, but by how it has been seen, stored, and studied. Recognizing the codex as a ceremonial manual, deeply intertwined in human action and the world around it, calls for digital engagements that are also situated, relational, and participatory. Rather than rendering the manuscript as static data or a decontextualized artifact, digital preservation must account for the complexity, vitality, and ongoing cultural life the codex embodies. In this light, the next section turns to literature on digital heritage, virtual repatriation, and participatory methodologies, identifying both the challenges and opportunities present in current approaches.

2.3 Stacking the Fire: Foundations in the Literature

Fire is not always a force of destruction. Like a hearth, it can be a site of care, continuity, and collective presence. In that sense, lighting a fire is an act of careful arrangement. After the first spark—after the codex has been brought into focus—comes the need to gather, assess, and position the ideas that will sustain the burn. This chapter stacks the fire: it reviews the existing literature that underpins the study of virtual repatriation, digital heritage, and participatory design.

What emerges is not a single flame but a constellation of embers—scholarly debates, conceptual frameworks, and cultural tensions—that illuminate the shifting terrain of cultural return in the digital age. By placing these pieces in conversation, this review constructs the foundation on which this thesis builds: a structure designed not only to ignite but to hold heat, to sustain reflection, and to invite transformation.

2.3.1 Virtual Repatriation and the Politics of Return

The concept of repatriation has historically referred to the physical return of individuals to their homelands, particularly those displaced through exile or enslavement. Over time, however, its meaning has expanded to encompass the return of cultural items, Ancestral Remains, and heritage objects to Indigenous communities. This broader understanding underscores the continued cultural, spiritual, and communal significance of these materials and acknowledges the deep injustices embedded in colonial practices (Fforde, McKeown, and Keeler 2020).

The legal framework governing cultural heritage repatriation is fragmented, complex, and often difficult to enforce, as it combines international treaties, national laws, and non-binding ethical guidelines (Biehl, Prescott, and Soderland 2013). Instruments like the 1970 UNESCO Convention establish mechanisms for cultural property protection, but their limited scope, lack of retroactivity, and heavy evidentiary burdens often hinder the efforts of source communities to reclaim stolen or displaced heritage (Prott et al. 2012).

Beyond legal and historical barriers, a philosophical divide further complicates repatriation discourse. On one side, cultural nationalists argue for the return of heritage to its place of origin, emphasizing identity, sovereignty, and community continuity; On the other, cultural internationalists advocate for universal access to cultural heritage, asserting that such materials belong to all humankind and should be housed where they can be best preserved and publicly accessible (Roehrenbeck 2010).

The case of the Maya codices exemplifies the convergence of these challenges. The Madrid, Dresden, and Paris Codices were transported to Europe without clear documentation of their archaeological provenance, and more than one modern nation-state can assert overlapping claims to the manuscripts. Under frameworks like the 1970 UNESCO Convention, repatriation claims require proof of illicit export or theft—criteria that are especially difficult to satisfy for materials removed prior to the treaty's ratification or lacking clear provenance (Prott et al. 2012).

In addition to legal ambiguity, the physical fragility of the codices poses further barriers, as they are highly susceptible to environmental damage. Conservation research confirms that even minimal exposure to light, humidity, or handling can cause further deterioration (Buti et al. 2014). As a result, material repatriation becomes not only a legal and diplomatic challenge, but a conservation risk. Compounded constraints such as this have fueled interest in virtual repatriation—a strategy that offers access without physical return, yet brings its own set of ethical and epistemic tensions around ownership, authority, and digital sovereignty.

Given the legal ambiguity and material fragility that complicate the repatriation of some artifacts, virtual repatriation has emerged as a pragmatic, if contested, alternative. Originating from Tony Gill's work in the early 2000s, the term initially referred to highly accurate 3D digital reconstructions of fragile or rare items shared between institutions, with the goal of accessibility rather than return (Biehl, Prescott, Boast, et al. 2013). Over time, however, the term has expanded to describe the digitization and online dissemination of cultural materials back to their source communities—ranging from digital surrogates of artifacts to full virtual exhibits.

Yet scholars like Boast and Enote (2013) argue that virtual repatriation is "neither virtual nor repatriation" when it substitutes data transfer for material justice. They contend that the term falsely implies both an ontological equivalence between digital representations and original artifacts, and a restitution of ownership or authority that rarely occurs. From their perspective, most digital surrogates originate not within source communities but in collecting institutions or academia, and calling this "repatriation" risks reinforcing the epistemic dominance of institutions that already hold power, while offering only symbolic or partial returns to Indigenous communities. Additionally, digitization can outpace ethical deliberation, particularly when sacred or sensitive cultural materials circulate online without the full consent or control of their source communities (Hennessy 2009).

Despite these critiques, virtual repatriation can be generative when re-framed as a methodology of collaboration and reciprocity. Qiaoyun Hu (2025 proposes understanding virtual repatriation not as a substitute for physical return, but as a reciprocal interface—a long-term, participatory process that centers the agency of source communities as co-creators and knowledge holders. This requires moving beyond platforms that merely offer access to data, toward systems that allow communities to curate, annotate, restrict, and reinterpret their cultural materials on their own terms (Hu 2025)

Projects like the Zuni Collaborative Catalog and the Inuvialuit Living History Project exemplify these principles. Instead of creating a single shared catalog controlled by outside institutions, the Zuni system allows the A:shiwi A:wan Museum to keep control locally over how their cultural materials are described and shared, pushing back against simplified or one-size-fits-all ways of organizing knowledge (2013). Similarly, the Inuvialuit project highlights self-representation, community consultation, and ethical management of digital content, showing how digital archives can be a space where cultural knowledge is reactivated, maintained, and shared on the community's terms (Hennessy et al. 2013).

In this light, virtual repatriation is not a fixed outcome, but a relational and iterative practice that depends on design, governance, and trust. It has the potential to reshape institutional-community relationships, provided it resists the tendency to equate visibility with justice or access with authority. For manuscripts like the Madrid Codex—too fragile to travel, yet rich with cultural meaning—such digital strategies may offer new forms of engagement, but only if grounded in the epistemologies, protocols, and priorities of the communities to whom they belong.

2.3.2 Participation, Co-Design, and Relational Ethics: Decolonial Approaches

In recent years, participation, co-design, and relational ethics have emerged as critical frameworks for rethinking how knowledge is created, shared, and acted upon—particularly within decolonial and Indigenous-led research. Participation refers to more than inclusion; it signals a shift toward shared authority, where communities are not merely consulted but actively lead and shape the process. Co-design emphasizes collaborative creativity, positioning community members as designers with lived expertise, not passive beneficiaries of external solutions (Udoewa 2022).Relational ethics is an ethical framework that emphasizes the moral significance of relationships, context, and mutual responsibility, foregrounding empathy, care, and interdependence over abstract principles or outcomes. Relational ethics, rooted in Indigenous research methodologies, foregrounds accountability, reciprocity, and the deep interdependence between researchers and participants. Relational ethics, rooted in Indigenous research methodologies, foregrounds accountability, reciprocity, and the deep interdependence between researchers and participants(Chilisa 2019).

These frameworks matter because they respond to longstanding critiques of extractive, top-down models of research and design that have historically marginalized community voices. In radical participatory design (RPD), for example, the goal is not to empower communities—an act that presumes prior disempowerment—but to divest power from institutions and return it to communities as rightful holders of agency and knowledge (Udoewa 2022). Similarly, archival theorists have called for a reconceptualization of the archivist's role—not as gatekeepers, but as facilitators of community-led practices that honor multiple epistemologies and cultural narratives (Punzalan and Caswell 2016).

This section looks at academic literature to explore how participatory methodologies move beyond inclusion to cultivate shared authority. This is especially important for re-framing digital engagement and cultural ownership in ways that center community voices, resist epistemic extraction, and imagine co-designed futures.

Participatory and co-design methodologies have long histories rooted in community life, predating formal academic or institutional recognition. As Udoewa (2022) argues, practices of collaborative design have existed in many cultures across the globe as organic responses to local challenges. Nonetheless, the origins of the co-design as an academic concept are often traced to the Scandinavian participatory design (PD) movement of the 1970s. Emerging in response to labor struggles and workplace democratization, Scandinavian PD positioned workers as equal contributors to the design of technologies that directly impacted their lives (Ehn 1988). Projects like UTOPIA, an initiative in the early 1980s that aimed to develop computer systems for newspaper graphic workers that enhanced their skills and preserved their craftsmanship, rejected the dominant user-centered design (UCD) paradigm, which often treated users as passive data points, instead emphasizing mutual learning, collective negotiation, and political accountability in the design process (Bannon, Bardzell, and Bødker 2018).

Over time, co-design has expanded beyond its labor origins into broader contexts of civic engagement, public policy, education, and cultural heritage. Ezio Manzini offers a theoretical framework for understanding design as a social conversation that unfolds across networks of both expert and non-expert actors (Manzini 2015). Manzini differentiates between expert design—design conducted by professionals—and diffuse design, or the everyday design practices enacted by individuals and communities in response to their own needs. In his view, all design today is inherently co-design: a distributed, collaborative negotiation of meaning, desire, and constraint. Within this framework, design experts are not authoritative problem-solvers but facilitators who help amplify and articulate community visions.

This reframing is echoed in the field of archival studies, where some scholars such have emphasized that community archives are not merely alternative repositories of memory but also affective and political infrastructures of collective agency (Punzalan and Caswell 2016; Cifor and Gilliland 2016; Caswell, Gabiola, et al. 2018. These scholars argue that

archives are not neutral containers of truth, but contested, dynamic sites where identities are negotiated and futures are imagined. Community-led archival practices, especially for marginalized groups, can support representational belonging — occupying and controlling space serves as a powerful affirmation of presence, identity, and belonging, offering both symbolic and emotional significance (Caswell, Gabiola, et al. 2018).

In contrast to narratives centered on ownership, redemption, or institutional restitution, Kim TallBear (2019) proposes caretaking relations as an alternative ethical and political paradigm. Drawing from Indigenous epistemologies of relationality, this framework understands humans, lands, ancestors, and more-than-human beings as co-constitutive and mutually responsible for one another. Rather than viewing return as a transactional act or symbolic gesture, TallBear calls for a reorientation of our ethical frameworks from possession and property toward relational accountability. In this view, meaningful return involves not the restoration of objects to former owners, but the reactivation of relationships, responsibilities, and governance systems rooted in Indigenous worldviews. Caretaking relations challenge settler-colonial logics of extraction and control, insisting instead on long-term reciprocity, situated knowledge, and the centering of Indigenous authority in decisions about cultural stewardship and sovereignty.

What emerges across these domains is a convergence of participatory design, relational ethics, and social justice—a move toward infrastructures that embody care, power-sharing, and epistemic plurality. As Bagele Chilisa (2019) and Linda Tuhiwai Smith (2021) have shown, Indigenous research paradigms challenge extractive models by insisting on relational accountability, spiritual grounding, and community-defined relevance. These frameworks disrupt the notion of ”the participant” as a fixed identity, reframing them instead as co-theorists and knowledge holders whose worldviews and protocols must shape not only the research questions, but also the tools, ethics, and afterlives of a project.

Building on these insights, literature has also highlighted the affective and embodied dimensions of participatory work. The notion of radical empathy emphasizes the ethical necessity of attentiveness to the emotions, vulnerabilities, and aspirations that participants bring into collaborative spaces (2018). Affect here is not auxiliary but central: a signal of relational health. Participatory infrastructures must therefore account not only for workflows and deliverables but also for trust, trauma, healing, and belonging.

2.3.3 Critiques, Gaps, and Directions Forward

While participatory and co-design methodologies offer emancipatory potential, they are also marked by tensions and critiques that raise critical questions about power, temporality, and epistemic legitimacy. As these methodologies become institutionalized, they risk being co-opted, instrumentalized, or rendered toothless—stripped of their critical and relational force.

One recurring tension lies in the misalignment between institutional timelines—grants, deliverables, and academic outputs—and the often slow, relational tempo of community-engaged work. Institutions often demand rapid demonstration of "impact," prioritizing performance over genuine transformation (Ahmed 2012). Participatory work, however, unfolds in non-linear, often recursive ways, grounded in trust, care, and relational accountability.

Additionally, as participatory methods gain traction, they are increasingly appropriated by dominant institutions. Terms like "co-creation," "stakeholder engagement," and "community voice" are often mobilized in superficial ways that sustain the status quo. Manzini (2015) warns against this flattening of co-design, cautioning that without a political and ethical commitment, participation risks becoming a tokenistic performance rather than a redistribution of power. Institutional embrace of participatory rhetoric often results in what Ahmed (2012) calls "non-performative commitments"—diversity statements and inclusion policies that signify progress while masking structural inequalities. Tuck and Yang (2014) argue that academia itself absorbs and domesticates radical frameworks. Inclusion becomes a form of enclosure wherein participatory methodologies are welcomed only when they fit within institutional epistemologies. Academia remains enthralled by trauma stories that it can package, circulate, and consume, leaving little room for joy, refusal, or radical imagination (Hooks 1990).

Against this backdrop, refusal is a stance of sovereignty—a declaration that some knowledge is not for extraction, translation, or institutional consumption (Tuck and Yang 2014). This is particularly urgent in Indigenous and marginalized contexts, where the "right to opacity" and the ethics of silence challenge the settler-colonial logic of limitless access (Glissant 2024). Refusal redirects the gaze from "giving voice" to recognizing limits, and from "empowerment" to shared vulnerability and self-determination. It insists that communities can participate by declining participation, especially when it means protecting sacred stories, complex political realities, or fragile relational ecologies from oversimplification or harm (Tuck and Yang 2014). Participation, in this view, includes the capacity to say no, to reshape the terms of engagement, or to disengage altogether.

Participatory and co-design methodologies are increasingly recognized across design, archival, and heritage fields, but significant gaps remain in how these frameworks account for Indigenous sovereignty and relational ethics—especially within the digital domain. This project, which co-designs an interactive storytelling game with Maya activists using the

Madrid Codex, intervenes in these gaps by reimagining co-design not as a set of methods or tools, but as a decolonial, affective, and relational process.

First, although co-design literature has emphasized collaboration and distributed creativity (Manzini 2015; Sanders and Stappers 2008), it continues to be dominated by Western paradigms that rarely interrogate how co-design unfolds when communities reclaim authority over cultural materials. Within digital heritage specifically, participatory practices are often structured by institutional timelines, external funding cycles, and technical infrastructures that leave little room for community-defined pacing, meaning-making, or forms of engagement. This project challenges those constraints by grounding the design process in Maya temporalities, epistemologies, and ethical commitments—privileging community sovereignty over institutional deliverables.

Second, while the concept of refusal has been robustly theorized in Indigenous and decolonial research (Tuck and Yang 2014; Simpson 2007), it has yet to be taken up meaningfully within co-design literature. The assumption that participation is inherently good or desirable excludes refusal from most design frameworks. This project actively resists this by framing refusal, ambiguity, and opacity as ethical design positions. In doing so, it makes space for Maya participants to set boundaries around what knowledge can be shared, how the Codex is interpreted, and what remains accessible to outsiders. Additionally, this project adopts a relational ethics approach rooted in Indigenous methodologies (Chilisa 2019; Smith 2021), treating co-design as a form of relational care—one that requires attention to grief, joy, memory, trust, and accountability. Working with the Madrid Codex, a sacred and colonially displaced manuscript, demands an ethics that can hold both historical trauma and future-making at the same time.

Third, although digital repatriation initiatives have expanded access to Indigenous cultural materials, many remain tethered to colonial infrastructures. Digital returns often occur on institutional servers, using digital infrastructures and interpretive frameworks controlled by dominant institutions. Even well-intentioned projects may replicate colonial logics by returning images without relinquishing interpretive authority, infrastructural control, or representational power (2016). This project challenges those dynamics by engaging Maya activists as co-authors of a living narrative —reimagining the Madrid Codex not as a static object of study, but as a dynamic and situated medium for contemporary storytelling, activism, and cultural revitalization.

Current frameworks often overlook how participatory work can be emotionally charged and relationally complex. As Caswell and Cifor (2016) argue, participatory archives and design processes carry affective weight that must be ethically held. This project attempts to bring these insights into design praxis by cultivating a relational ethics of care, trust, and co-responsibility—especially as the Codex itself is entangled in histories of colonization, displacement, and fragmentation.

Taken together, this project contributes a decolonial reorientation of co-design, grounded

in the specific political, cultural, and affective landscapes of Maya communities. It refuses dominant narratives of “access” and “inclusion” in favor of co-created infrastructures that foreground sovereignty, care, and creative resurgence. By collaborating on a digital interactive storytelling game, Maya activists can reclaim narrative and representational agency, not only animating the Codex, but also transforming the digital space into a site of cultural continuity and resistance. In doing so, the project models an alternative to extractive digital heritage practices, offering a framework for anti-colonial co-design that is both situated and aspirational.

flames

This thesis uses fire as a metaphor to reflect upon both the historical destruction of Maya cultural heritage and the generative efforts to reclaim it in the present. In this chapter, I trace the continuity between colonial acts of erasure, such as the burning of codices, and the cultural, epistemic, and digital challenges that persist to this day. Fire, in this context, signifies not only loss but also resistance, illumination, and transformation. I look at current community-led projects in the sphere of digital activism and how these practices are not just acts directed towards access, but political interventions that challenge the structures of knowledge ownership and cultural representation. I situate virtual repatriation as both a methodological approach and a political act, one that must seek to make cultural artifacts available not only digital surrogates, but also giving epistemic authority to Indigenous communities in order for something to be ”returned”. Within this framework, I introduce the collaborators with whom I have worked closely and describe the development of our interactive storytelling prototype. This prototype, designed in partnership with Maya collaborators, aims to show how digital media can serve as a site of co-creation, cultural continuity, and pedagogical play.

3.1 Ignition: From Destruction to Reclamation

In *Leyendas y consejas del antiguo Yucatán* (Legends and tales of ancient Yucatán), Mexican writer Ermilo Abreu Gómez imagines a confrontation between Nachi Cocom, one of the last Maya leaders resisting Spanish colonization, and Fray Diego de Landa. Stepping up to the podium where de Landa and the judges stand, Nachi Cocom calls out:

> ”Listen to me. You will never be able to burn these words. This voice, which is my voice and that of the Indians, will pierce your ears, and you will never be able to forget it...This, flying over the torture and fire and death, is the truth and the reason of the men of this land you tread upon. This, which I now say, will rise before your eyes, and the last thing those eyes will contemplate is the horror of the pain you have caused.”

First published in 1961, nearly four centuries after de Landa ordered the burning of the codices, *Leyendas y consejas del antiguo Yucatán* reimagines the fire not only as a weapon

wielded against the Maya but also as a symbol of enduring resistance. In Abreu Gómez's narrative, Nachi Cocom himself becomes flame-like, his presence consuming the plaza alongside the literal fires.

Although the fires that destroyed most Maya codices were lit centuries ago, their impact continues to smolder in the tensions between hegemonic narratives and Indigenous resilience. The struggle over historical memory remains evident in the fragmentation, rewriting, and selective preservation of Maya history. Much of what survives of pre-Hispanic Maya knowledge comes filtered through the colonial gaze, often shaped by figures like Diego de Landa, who simultaneously sought to destroy and to document the civilization he encountered. His *Relación de las cosas de Yucatán*, one of the primary sources on pre-Hispanic Maya culture, is thus both a record of cultural richness and a product of colonial violence.

Some have suggested that de Landa's documentation efforts may have been motivated by guilt. However, Clendinnen (2003) dismisses the notion that *Relación* was an act of atonement, identifying it instead as a continuation of the same paternalistic ideology that justified the violence. She interprets de Landa's actions through the lens of Franciscan paternalism, a worldview in which Indigenous peoples were regarded as children requiring protection, discipline, and correction. Within this framework, resistance to Christianization was seen as an act of "filial betrayal", and punitive violence became justified as a form of spiritual guardianship. Rather than recognizing Maya resistance as a legitimate assertion of agency, de Landa interpreted it as evidence of immaturity or stubborness.

Whatever motivations underpinned his writings, what remains is the account of a man whose regard for the culture he documented is deeply questionable. As Abreu Gómez's Nachi Cocom tells de Landa: "This, which rests upon my tongue, your tongue will never be able to repeat without being cut." Although these words were written centuries after the events they describe, they point to an enduring question: How much of what was originally carried in the language of the Maya could ever be faithfully transmitted by their colonizers?

However, the Maya have never been silent. Even in the face of violence and cultural suppression, they have continued to exercise agency, resilience, and resistance across generations. This enduring vitality has not only persisted through oral tradition, cultural practice, and community memory, but has also found new expressions in the digital sphere. As the internet becomes an increasingly integral part of daily life, Maya communities and their allies have begun to reclaim virtual spaces as sites of activism, creativity, and cultural resurgence.

Rather than passively adopting digital technologies, Indigenous communities actively reshape and reimagine them according to their own cultural frameworks, challenging colonial structures embedded within global communication systems (Martens, Venegas, and Tapuy 2020). This reimagining is evident in multiple ways: by embedding ecological,

spiritual, and communal relationships into digital maps, storytelling platforms, and environmental defense projects; by building autonomous communication infrastructures independent from state or corporate control; and by transforming social media into collective spaces of activism and ritual rather than sites of individual consumption(Martens, Venegas, and Tapuy 2020). In Mexico, Indigenous activists have used social media platforms like Facebook, blogs, and web pages to mobilize support, disseminate information, and document collective action in the defense of water and territorial rights, building an "Indigenous digital identity" (Armenta 2021). This form of activism complements traditional methods of resistance, such as protests and assemblies, extending struggles for land, language, and cultural survival into digital environments. By appropriating and repurposing digital tools, Indigenous communities are forging counter-hegemonic narratives and networks, ensuring that their histories, cosmovisions, and rights continue to circulate and resist erasure both offline and online.

3.1.1 Community Media and Activism

This growing landscape of counter-hegemonic assertion is visible in community-led media initiatives. From autonomous cellular networks to music videos, these initiatives demonstrate how digital infrastructures can be repurposed to support community sovereignty and intergenerational knowledge transmission. In places like the town of Villa Talea de Castro, nestled in the Sierra Juárez mountains of Oaxaca, Mexico, residents created and now operate their own community-run mobile phone network after being declined service from major telecom companies who deemed their community unprofitable. Supported by the organization Rhizomatica, the network is deeply integrated into local governance, supports interpersonal and emergency communication, and has played a role in strengthening the local economy (Bravo Muñoz 2020).

These acts of infrastructural autonomy exist alongside a vibrant constellation of digital activism on social media platforms. From educational YouTube channels and meme pages to TikTok videos blending humor and advocacy, these initiatives do more than promote language use: they reimagine what Maya cultural presence can look like in the digital age. As Cru (2024) notes, this shift is not only technical but political: it challenges long-standing ideologies that frame indigenous languages as "backward" or incompatible with digital modernity , and instead repositions Maya youth as cultural agents capable of shaping new media landscapes on their own terms.

Much of this effort is not state-sponsored or institutionally coordinated. Rather, it emerges from individuals, collectives, and online communities deeply embedded in local realities, which are in turn being expressed and realized online. These grassroots efforts have been supported by initiatives such as the Mayan Languages Digital Activism Fellowship Program from Rising voices. Rising Voices has collaborated with Maya activists to facilitate workshops, provide digital tools, and foster community around language revitalization and

media creation through spaces for exchange, collaborative learning, and the articulation of shared goals across diverse projects (Rising Voices n.d.). Initiatives include podcasts, digital books, community radio, and language learning content in Mayan languages like Yucatec, Tzotzil, and Tseltal.

Platforms like Facebook are now central arenas where Indigenous communities articulate claims, reinforce identity, and extend offline activism into networks of collective action and identity that connect multiple local struggles across different geographic regions(Armenta 2021. Whether mobilizing for environmental justice or revitalizing language, Indigenous digital activism blurs the line between presence and performance, turning social media usage into acts of meaning-making.

These practices are not merely efforts to gain access to digital spaces, they are also interventions that challenge the structures of knowledge ownership and cultural representation. By creating, circulating, and governing their own media, Indigenous communities assert the right not only to speak, but to define the terms of their speech and the aesthetics of presence. Whether through memes, mobile networks, or videos, these initiatives confront colonial logics that have historically positioned Indigenous peoples as subjects of study rather than authors of meaning. In doing so, they not only resist erasure but actively reconfigure the digital as a space of Indigenous expression.

3.1.2 Thirteen Bak'tuns and Twelve Years

When I was twelve years old, the world was supposed to end. At least, that's what people said. In 2012, pop culture was flooded with speculation, anxiety, and apocalyptic fantasies, all based on a misunderstood date from the ancient Maya calendar. I remember the conversations vividly: some made light of it, turning the so-called "end of the world" into a joke; others spiraled into panic, stocking supplies or quoting conspiracy theories. The release of the movie *2012* only added fuel, dramatizing a global cataclysm tied not to science or scholarship, but to the cinematic spectacle of destruction. What few people seemed to question was how a culture capable of crafting such an intricate calendar could be so easily reduced to a doomsday myth.

It is interesting how so many people looked at a sophisticated, mathematically precise calendar and saw only a countdown to doom, rather than a testament to intellectual and cultural skill. Only later would I learn what the Maya were actually marking: not the end of time, but the end of a Great Cycle—the completion of thirteen bak'tuns, amounting to 5,128 years in the Long Count calendar. Their calendrical systems reflected a deep understanding of astronomy, agricultural rhythms, and ritual life, an epistemology far more profound than what the media chose to portray. What is lost in these simplifications is not only the history but also the ongoing work of cultural labor and resilience.

Now, twelve years later, popular narratives seem to have moved on, but there is also renewal to be talked about. It takes shape in language revitalization projects, the devel-

opment of community-based media, and complex networks of digital indigenous identities.

My path into this project began with a long-standing fascination with stories and the many forms they take. I have always been drawn to the languages that shape them, the letters that preserve them, and the voices that bring them to life. Naturally, books hold a deep personal and academic appeal. Yet when thinking about the loss of books, my mind would instinctively turn to the Library of Alexandria or the destruction of literature during the Holocaust. The destruction of the Maya codices, however, remained only marginally present in my consciousness, despite arguably being closer to me as a Mexican person.

While modern Mexican national identity has historically emphasized a *mestizo* (mixed Indigenous and European) heritage that can in itself be racially problematical (Moreno Figueroa 2022, education and popular identity include to some extent basic knowledge or at least acknowledgment of pre-colonial indigenous civilizations. I happened to be better placed than a lot of people to know about the codices, but I barely knew anything beyond the fact that they had existed at one point.

This made me wonder about what stories are prioritized and how. As I deepened my understanding of this erasure, I became more attuned to the importance of language in the transmission of stories, and particularly to the stakes of digital representation. Prior to this thesis, I had worked on a project involving Greenlandic natural language processing (NLP), and in the process of researching available tools, I encountered Google Translate's recent inclusion of several Indigenous languages, including Kalaallisut (West Greenlandic) and Yucatec Maya. Advances such as these show that there is growing interest in indigenous NLP.

Initially, I saw this as an exciting opportunity to explore how similar technologies might be applied to the Maya codices. My first step was to survey what digitized codex materials were available online, and this led me to reach out to scholars working on Maya writing and culture. Yet the deeper I delved, the more I realized that the most urgent questions were not technical. Beyond the tools themselves lay larger concerns about the forms in which codices have been digitized, the politics of their representation, and my own assumptions as a researcher. Language is essential to story, and its inclusion in the digital sphere matters deeply, but so does the *how*. Why did I feel compelled to use the codices? What was the purpose of applying NLP? Who stood to benefit from it? These questions unsettled my initial goals and reframed my approach. It became clear that I needed to take a step back from datasets and tools and first listen to those who live with, think with, and work to revitalize Maya knowledge. This shift led me to contact Maya digital activists, whose insights fundamentally reshaped the project.

3.2 Burning: Digital Repatriation in Practice

The physical flames that once consumed Maya codices in colonial fires may be gone, but the logic of erasure persists in the form of inaccessible archives, fragmentary digital reproductions, and the continued displacement of Indigenous knowledge. As more cultural heritage materials move online, questions of access, control, and authorship become increasingly urgent. The promise of digitization as a means to preserve, democratize, and share sits uneasily alongside the realities of technological gatekeeping and institutional dominance. This section explores the tensions that shape the digital lives of the codices today, from the limitations of existing digital archives to the political stakes of virtual repatriation by first asking the question:

3.2.1 What burns in the Digital Age?

The destruction of books and archives has historically been a method not just of cultural suppression, but of political domination, erasing narratives that threaten dominant regimes (Ovenden 2020). Just as Diego de Landa's fires in 1562 sought to obliterate Maya epistemology, contemporary struggles over digital knowledge echo this legacy; this time not through literal flames, but through deletion, deplatforming, and server shutdowns.

In today's context, the deliberate suppression or erasure of digital content; whether through state censorship, commercial litigation, or algorithmic bias could be considered a book burning of sorts. While such actions are often justified as efforts to combat misinformation or protect intellectual property, they frequently result in the erasure of marginalized histories, dissenting voices, and non-dominant epistemologies (Haimson et al. 2021). In the digital age, the erasure of history has taken on new forms that do not rely on fire. In the United States for example, following the 2025 executive order *Restoring Truth and Sanity to American History* (Donald J. Trump 2025), federal agencies were tasked with promoting an "uplifting" narrative of the nation's past.

Even though Marsha P.Johnson, a trans woman, is largely credited with having started the Stonewall Riots, the U.S. National Park Service removed references to transgender individuals altogether from the website of the Stonewall National Monument. Their "History and Culture" section how reads *"Stonewall was a milestone for LGB civil rights"* (National Park Service 2025). This can be viewed as an act of digital historical revision that erases the very communities the site was meant to honor. Just as fire once consumed codices, today digital archives are still vulnerable to deletion or reshaping through political pressure. What's more, they may not go up in a big display of fire, but be extinguished silently.

Some activists, particularly within LGBTQ+ communities, have responded by advocating for the creation of physical collections and independent archives, a strategy that echoes the safeguarding of cultural memory in the face of colonial destruction. This is not to say

digital efforts are fruitless. Rather, while digital preservation offers immense potential, it is not immune to political interference, legal challenges, or institutional neglect Ovenden 2020 . Servers can be turned off, websites rewritten, and content shadowbanned or censored. In this context, digital book burning becomes a modern form of epistemicide, where history is not incinerated, but re-coded, removed, or rendered invisible. This continuity between physical and digital acts of erasure reveals a common goal: control over collective memory.

That is to say that digitization, far from being neutral, is inherently political. Decisions about what to digitize, how to catalog it, who can access it, and under what conditions, are all shaped by institutional priorities, legal constraints, and power. This is especially evident in the case of Maya codices: although the Madrid Codex itself is in the public domain, access to high-quality scans is often mediated by the institutions that hold the physical manuscripts. For example, the Museo de América in Madrid, which houses the original codex, controls access to its high-resolution reproductions and asserts ownership over the digital images, reserving exclusive rights to reproduce, distribute, or modify them—even when the underlying artifact is no longer under copyright. Their conditions explicitly prohibit the redistribution of catalog content on other servers (Ministerio de Cultura 2025), restricting the ability of source communities, educators, or digital activists to freely share or recontextualize the material. Similarly, while platforms like Yale Digital Collections provide open access to facsimiles, they caution users that reproduction and distribution may still fall under institutional guidelines or U.S. copyright law, depending on the format and metadata of the digital object (Yale University Library 2025).

Digitized cultural heritage is not automatically democratized by virtue of being made available online. Often, only select versions or lower-resolution images are freely accessible, while high-quality files, metadata, or permissions for reuse remain restricted, reinforcing the asymmetry of access between institutions and source communities. In this way, digital archives become new arenas for gatekeeping, where control over the digital reproduction replaces control over the physical artifact and ownership is reasserted, this time through legal codes rather than colonial conquest. Notably absent from such policies is any mention of consultation with Indigenous communities whose knowledge and history is contained within the artifacts.

Although digital archives offer unprecedented potential for preservation and accessibility, they are also fragile and contingent (Ovenden 2020), dependent on material infrastructures, systems of ownership, surveillance, and capital. Access to knowledge is still determined by who owns the server, who funds the archive, and who controls visibility—making the digital realm just as vulnerable to erasure as any library under siege.

All things considered, the burning of Maya books is not a closed chapter, but part of an ongoing, global struggle over knowledge, power, and historical memory. Whether through fire or fiber optics, acts of epistemic violence continue to manifest in new forms. They raise

urgent questions: Whose knowledge is preserved? Whose is erased? And who gets to decide? These questions call for a re-evaluation of preservation practices, greater investment in open and inclusive archives, and a recognition that both physical and digital knowledge infrastructures are political battlegrounds.

3.2.2 The Codices Online: Access and Absence

The Madrid Codex has lived many lives. It has been a ritual object, a colonial trophy, a scholarly artifact, and now too a number of digital surrogates. Objects accumulate meaning through circulation and through the regimes of value they traverse Appadurai 1988, but circulation does not guarantee integrity. In entering the digital sphere, the codex is not only preserved but recontextualized. It is flattened, translated, and reframed through the technological, institutional, and epistemic systems that mediate its presence online. Latour (1996) concept of objects as actors in social networks remains relevant here: the codex continues to gather new relations, but the terms of those relations are now shaped by servers, interfaces, metadata standards, and institutional policies.

This shift raises difficult questions. What does it mean for a ritual manuscript to live on a server? What is lost when a divinatory object becomes a high-resolution image without ceremony, smell, or sound? Benjamin (2018) concern that mechanical reproduction might strip an object of its aura takes on new urgency in the digital age, where the codex is rendered simultaneously hyper-visible and ontologically distant. We see more, and we know less. The codex becomes searchable but not necessarily knowable, its embeddedness in land, body, and performance replaced by detached access.

At the beginning of this project, I set out to discover what was publicly available online in terms of the Maya codices. What I encountered was a fragmented and uneven terrain of access. Some codices, like the Dresden, have been relatively well digitized and are viewable in high quality. The digital interface of the Saxon State and University Library (SLUB) Dresden allows for smooth navigation across the manuscript and offers high-resolution zooming capabilities. Others, like the Madrid and Paris codices, are less visible. The Paris Codex, in particular, is physically damaged, with several sections rendered illegible. As Dr. Stephen Houston,an eminent Maya archaeologist and epigrapher at Brown University, noted in our brief correspondence, studying artifacts exclusively through their digital counterparts presents challenges due to photographs being taken “at the wrong angle, with poor, flat lighting.” While high-resolution reproductions are sometimes available, they are rarely accompanied by the contextual information or licensing frameworks that would support engagement beyond academic use.

Seeking further insight, I contacted Dr. Alex Tokovinine, a Maya epigrapher and anthropologist at the University of Alabama. He pointed me towards three major digitization efforts in the field, each with its own institutional context and approach to structuring hieroglyphic data:

- **The Maya Hieroglyphic Database and Dictionary Project** (Textdatenbank und Wörterbuch des Klassischen Maya) based at the University of Bonn and directed by Prof. Dr. Nikolai Grube. Funded by the North Rhine-Westphalian Academy of Sciences, Humanities and the Arts and the Union of the German Academies of Sciences and Humanities. Its aim is the creation of a comprehensive dictionary of Classic Mayan.
- **The Maya Hieroglyphic Database Project**, founded by Prof. Emeritus Martha Macri and currently directed by Prof. Matthew Looper at California State University, Chico, is supported by the National Science Foundation (NSF) and the National Endowment for the Humanities (NEH). The database relies on the Thompson and Macri cataloging systems and is geared toward comparative research in Maya epigraphy.
- **The Maya Codices Database**, developed by Dr. Gabrielle Vail and hosted at the University of North Carolina, features a searchable translation and analysis of the four surviving Maya codices. This project focuses on presenting the glyphic content of the codices specifically, but has not been updated in some time. Its interface is somewhat limited when compared with more recent projects, but the platform does offer an accessible entry point in the sense that it allows the user to approach in a more exploratory way.

These projects represent invaluable contributions to the field of Maya studies and offer rich potential for research, education, and public engagement. Each one provides a different entry point into the complex world of Maya writing and knowledge systems. At the same time, many of these platforms are primarily designed for specialists and often assume prior familiarity or require a certain technical and linguistic expertise. Access can also be shaped by institutional frameworks. For instance, the Maya Codex Dataset hosted by the Idiap Research Institute in Switzerland provides high-resolution glyph data from the Dresden, Madrid, and Paris codices, along with a statistical co-occurrence model. This model tracks how often individual glyphs appear together across the codices, offering valuable insights into the structural and contextual relationships between signs. For researchers in epigraphy and NLP, this opens up important possibilities, as such data could be used to train computational models, identify syntactic patterns, or allow for comparison across textual corpora. While access to the dataset is restricted to non-commercial academic research and requires institutional representation, I was only able to access it through my supervisor. The dataset itself represents a significant contribution to both computational linguistics and the digital study of ancient writing systems, but it also serves as an example of how academia can sometimes mediate entry into these cultural artifacts. The codices seem to exist online mainly for academic purposes.

While still somewhat geared towards research, the work of Dr. Gabrielle Vail, one of the most active researchers in the digital dissemination of Maya codices, also reflects a more accessible approach. Her long-standing project, The Maya Hieroglyphic Codices

(http://mayacodices.org), offers a searchable platform for engaging with the texts and translations. In our interview, she explained how her early training in creative writing and her exposure to fieldwork has shaped her study of Maya epigraphy. Her interest in digital tools evolved partly through collaboration with her husband, a computer scientist, which enabled her to experiment with more interactive approaches.

Vail emphasized that while she is deeply committed to the potential of digital humanities, she is also acutely aware of the infrastructural and epistemic challenges. Many Maya-speaking communities still face barriers to reliable internet or access to computers, which limits the reach of even the most accessible tools. She also expressed concern over the lack of coordination across digitization efforts. Despite the proliferation of projects, few are in dialogue with one another, resulting in duplicated work and missed opportunities for synthesis. While optimistic about the potential of digital tools, for Vail the question is not just how to repatriate artifacts, but how to repatriate knowledge, particularly when it is intangible, highly specialized, and often divorced from contemporary community contexts. She reflected on how epigraphy, no longer a living tradition, can feel distant to Maya communities today, and stressed the need to share these forms of knowledge through in-person workshops and pedagogical tools that bridge the technical and the cultural.

Taken together, these experiences reveal a digital landscape that mirrors the political ambiguities of physical repatriation: codices may circulate as images or data, but access remains conditional. There is a level of technical literacy and academic privilege that mediates who and how the codices are accessed online. The infrastructure is fragmented, and the pathways seem to be shaped more by the needs and languages of researchers than by those of Maya communities. Even where intentions are generous, the tools can be unintentionally exclusionary. While digital formats promise reproducibility and long-term preservation, they do not resolve deeper questions of ownership, representation, or epistemic justice. Who is this for? Who can see it? Who is allowed to use it and under what terms?

To speak of “burning” in this context is to speak not of fire, but of subtler forms of erasure: disconnection, decontextualization, and the dissolving of cultural authority under layers of interface, licensing, and digital “neutrality”. What is burned is not the codex itself, but the systems of meaning that once held it. This tension, between visibility and displacement; access and abstraction; harm and possibility; is precisely where debates over digital heritage and virtual repatriation must take place.

3.2.3 Virtual Repatriation: Between Method and Political Act

Virtual repatriation is often understood as the digital "return" of cultural heritage through images, scans, or other forms of digital surrogates to originating or affiliated communities. It has gained momentum as a practical alternative in cases where physical repatriation is made difficult by legal ambiguity, material fragility, or institutional reluctance. In its most common form, virtual repatriation involves digitizing cultural artifacts held by museums, archives, or libraries and making them available online. While this approach increases access, it often remains non-relational: the process is typically designed and controlled by institutions, with little to no involvement from the communities to whom the materials belong. As a result, the artifacts are made visible, but not necessarily meaningful or responsive to the cultural, epistemic, and affective contexts in which they were once embedded.

At the same time, any conversation about repatriation, digital or physical, must grapple with the question of to whom such objects would be returned. As Dr. Stephen Houston pointed out in our correspondence, the surviving codices may have originated in regions now divided by modern nation-states—Mexico, Guatemala, or Belize. The Maya are not a monolithic group, but a network of culturally and linguistically diverse communities. With over 30 living Maya languages and distinct regional traditions, questions of custodianship are complex. Do the codices belong to the modern nations that claim them? To the broader Maya world as a collective cultural inheritance?

Rather than resolving these questions, digital projects often bypass them by treating the codices as data rather than as culturally embedded objects whose significance remains active, situated, and contested. This ambiguity complicates efforts to define what digital repatriation should look like and reminds us that "return" is not always easily defined.

The term "return" in the context of virtual repatriation is far from straightforward. It implies a restoration of something to its rightful place, but this framing often obscures the complex histories of extraction, displacement, and ongoing colonial power dynamics. Virtual repatriation, by offering digital surrogates rather than physical objects, complicates notions of presence and absence. To speak of return is to engage with layered issues of ownership, authority, and recognition, all of which are shaped by colonial legacies and institutional control. As such, the very language of "return" must be scrutinized. Historian James Clifford (2013) argues that return is rarely a simple act of reversal or restitution. Heritage objects, he notes, often live "second lives" after repatriation, acquiring new meanings through contemporary practices. In this sense, return is not about recreating the past, but about opening space for cultural transformation in the present.

From this perspective, simply scanning or photographing a cultural artifact does little to "return" them. Unlike physical repatriation, which often hinges on legal ownership and the physical transfer of materials, virtual repatriation is not about possession, but about

relation. It's not merely about *what* is returned, but *how, to whom,* and *under whose terms*. Access is not a neutral condition of availability, but a situated and relational practice. Interpretation, too, is not a one-way extraction of meaning by experts, but a co-creative process that honors community-based knowledge and authority.Rather than a technical fix or an endpoint, this thesis frames virtual repatriation as a methodological and relational commitment.

Building on Kim TallBear (2019) vision of caretaking relations, virtual repatriation can be reframed not as the transfer of digital assets, but as a commitment to relational accountability. Rather than viewing cultural heritage as property to be returned, TallBear urges us to center responsibilities to people, places, and more-than-human kin. In this framing, heritage stewardship is not a task of preservation alone, but a political and ethical relationship: a way of being with, rather than owning. Knowledge is not an object to be extracted, classified, or owned; whether in archives, datasets, or research publications. Instead, knowledge should be tended and activated within the relational contexts that give it life. In this view, digitizing or repatriating cultural materials isn't just about access; it's about sustaining the relationships that made and make that knowledge meaningful. Virtual repatriation, then, becomes a form of relational infrastructure.

This kind of relational practice is necessarily slow, negotiated, and adaptive. It resists the impulse for tidy resolutions or quick technological fixes. The complexities of cultural authority, access, and interpretation cannot be resolved through digitization alone; they must be continuously revisited in collaboration with the communities for whom these materials matter. In this sense, repatriation becomes a political act, not because it is confrontational, but because it challenges the assumption that knowledge can be copied, cataloged, and distributed without regard for the people and contexts that give it life. By shifting the emphasis from data to relationships, from access to accountability, virtual repatriation invites us to reimagine not just where cultural heritage resides, but how it lives—and who gets to shape its future.

These principles of relational accountability and co-stewardship directly informed the design of the interactive storytelling game prototype that emerged from this thesis project. Rather than positioning the codices as static texts to be decoded or consumed, the aim is to treat them as living sources that invite contemporary re-interpretation and engagement. The idea itself was developed in dialogue with Maya digital activists. The narrative structure emphasizes continuity between past and present, weaving together ritual knowledge, ecological relationships, and everyday cultural practices. In doing so, it resists the tendency to flatten Maya knowledge into "content" and instead supports participatory meaning-making, where stories are not just told about the Maya, but are told with and through Maya voices and epistemologies. In this way, the prototype becomes a small but tangible instance of virtual repatriation not simply by returning digitized knowledge, but by cultivating new, reciprocal relationships around it.

3.3 Where Sparks Meet

When Ermilo Abreu Gómez opens *Leyendas y consejas del antiguo Yucatán* with a dedication to his wife Margarita, it is not in the voice of a scholar or collector, but that of a storyteller shaped by love, memory, and relationship. “Here you have them, Margarita, the stories I promised you. Some were told to me by natives of my land,” he writes, “and others I read in chronicles from different eras... I have limited myself to gathering those that seemed most beautiful and most meaningful to me and rewriting them as I understood them, that is, with simplicity, decorum, and a little bit of innocence.” In this brief note, Abreu Gómez captures something essential: that stories are not just inherited, they are relationally carried, felt, remembered, and reshaped in the telling. The truth, for him, lives not in historical certainty, but in the ”trembling of fear and joy” (Gómez 2012) that these stories evoke.

This ethos of storytelling as relationship, not just content, resonates deeply with the conversations that shaped this project. I turn now to the exchanges that animated its most vital dimensions. These conversations, part methodological insight, part cultural encounter, were not about gathering data but about forming relationships. Like Abreu Gómez, I did not set out to collect definitive truths, but to listen, to learn, and to participate in a shared process of imagination and interpretation. Each conversation became a spark, a point of contact where different perspectives met and something new was set into motion.

3.3.1 Conversations on Revitalization

The initial conversations that I engaged on placed great emphasis on youth, language use, and reclaiming visibility. One of the first voices to shape this project was Catalino Noh May, a passionate independent promoter of Yucatec Maya language and culture. Originally from San Martiniano, Quintana Roo, and trained in Alternative Tourism at the Intercultural Mayan University, Catalino merges environmental, spiritual, and pedagogical commitments in his work. In his article “In t’aane in muuk’: My language, my strength”, he writes: “The most valuable legacy I have received is my language... Through my activism, I seek to rescue, preserve, and disseminate the Mayan language and knowledge so that our voice can be heard throughout the world” (May 2023). I reached out to him after reading those words, sensing a deep resonance with the questions I was beginning to ask about the codices, digital heritage, and visibility.

Our exchange unfolded over WhatsApp, a small but telling choice: it is the most widely used messaging app in Mexico, and one that, like Facebook, is central to Maya digital activism today. Catalino told me that his work focuses on teaching, spirituality, and the digital sphere, and that his priority is reaching Maya youth, whose increasing use of mobile phones and social media can at times alienate them from the Mayan language, as Spanish tends to be a more convenient alternative. Nonetheless, he sees opportunity in

transforming these spaces for the benefit of the language and cultural transmission. As an elementary school teacher, he has experimented with games to engage his students and is active in a digital activism network that spans Campeche, Chiapas, and Quintana Roo, aiming to include a plurality of Maya voices. He began sharing recordings of ceremonies and cultural content online, which eventually led to his involvement with the Rising Voices network.

Catalino's reflections offered critical insight into how language use online is shaped by difficult choices: whether to use Spanish for reach or Maya for intimacy; whether to speak broadly or closely. "We only recently got the internet," he said, pointing out that while digital tools are promising, access remains uneven specially for more rural communities. Additionaly, while he personally tends towards educational content, he says that it often circulates in limited ways, as opposed to things like entretainment for example. His relationship to tools like Google Translate is ambivalent: while he welcomes the recognition of the language, he also notes it's currently too literal, providing accurate word to word translations but stumbling with sentences. Additionally, he pointed out that orthography tends to be inconsistent. Yucatec Maya, he emphasized, remains deeply oral, and only recently has it entered formal education systems. Mexico's INALI (National Institute of Indigenous Languages) created under the *Ley General de Derechos Lingüísticos de los Pueblos Indígenas* (General Law on the Linguistic Rights of Indigenous Peoples) was not stablished until 2003. The lack of orthographic standardization and the natural evolution of language, especially among youth using abbreviations and informal spellings, makes digital revitalization both vibrant and complex.

Although epigraphy is not his area of focus, Catalino expressed curiosity about the codices and asked me to share what I had learned. I sent him materials by email, and he offered to connect me with his colleague Alfredo Hau, who works more closely with Maya writing. What struck me most, however, was Catalino's relational approach: his willingness to stay in contact, to exchange knowledge, and to imagine new ways of making the Maya language more visible both online and internationally. Our conversation was not about solving a research question; it was about building the kind of trust and reciprocity that this project,as a form of virtual repatriation,aims to honor.

If Catalino Noh May reminded me that language is strength, then Alfredo Hau showed me how writing, especially ancient writing, can become a bridge between disconnection and belonging. Alfredo's primary work centers around bringing Maya epigraphy into communities through workshops designed to reconnect people with their own history. His project, *Chíikulal Úuchben Ts'íib* (Ancient Writing), is run in collaboration with his brothers and promoted through Facebook, where he shares updates about his outreach efforts across the Yucatán and Quintana Roo areas. Each year, he conducts approximately ten workshops, though he wishes he could do more. Funding remains a challenge, as "activism doesn't pay the bills," he told me plainly. Despite these limitations, his motivation is clear: to help Maya communities see themselves in the histories that have often been kept from

them.

Alfredo spoke of an identity gap: the sense among many community members that the past belongs to someone else. Historical artifacts, he explained, are too often framed within academic or institutional contexts that feel distant, abstract, and closed. But when people, especially children, engage with materials like the codices, something changes. “They’re surprised to see that their ancestors used to do things that are still done to this day,” he said. The recognition is not just intellectual; it is emotional and embodied. It creates a sense of continuity. “How can people value themselves,” Alfredo asked, “if they don’t know their heritage?”

His work aims to close this gap by restoring visibility and proximity to history, identity, and forms of knowledge that are often marginalized. He sees the act of learning within the community as essential. It is not enough for scholars or institutions to study the Maya; the community must be the ones to tell their own stories, to read their own signs, to see their own reflection in the glyphs. He has seen how artisans, for example, incorporate glyphic symbols into their crafts sometimes without even realizing the historical depth of what they are doing. For Alfredo, this is a sign that heritage is alive.

Although excited by the possibilities of digital activism, Alfredo is also cautious. He sees how educational content and community voices struggle to gain traction in online spaces that reward virality and spectacle. “Who is listened to on the internet?” he asked me. “It’s not Mayan speakers who go viral.” This digital imbalance reflects deeper epistemic inequalities. Projects developed outside the community often result in inaccurate representations or extractive practices, leaving little tangible benefit for the people whose culture is being interpreted. Alfredo wants to flip that script: he advocates for heritage work that is not only done about communities, but from the perspective of knowledge providers within them.

Like Catalino, Alfredo places great importance on the next generation. He dreams of expanding his work and supporting more children in discovering the richness of their heritage. He pointed out, proudly, that Cuncunul was the first municipality to adopt a modern emblem glyph, a visual declaration of identity. His commitment is not just to the past, but to a future where Maya children grow up knowing that stories of their family are inscribed in history and alive in their hands. “Nobody can care for things they don’t know” he told me. His work seeks to ensure that this heritage is remembered, renewed, and written back into the lives of those to whom it belongs through both workshops and digital tools.

3.3.2 Creativity, Humor, and the Life of Language

My next conversation, while still placing emphasis on learning and visibility, also turned towards creativity, pointing to the importance of linguistic and cultural expression in dynamic, joyful formats. This shift highlighted how revitalization efforts are not only about preservation or resistance, but also about play, humor, and everyday pleasure. In speaking with Didier Argelio Chan Quijano, it became clear that language does not live only in institutions or formal spaces; it thrives in song, jokes, affectionate nicknames and casual conversations. His work underscores how digital tools can amplify not only what is taught, but what is felt, offering younger generations a vision of Maya not as something ancient or fragile, but as something vibrant, flexible, and alive in the present.

While Alfredo focused on reconnecting communities with their historical inscriptions, my encounter with Didier Argelio Chan Quijano turned toward the everyday life of language: its humor, adaptability, and musicality in the present. My first encounter with Didier wasn't through an article or academic paper, but through a song, "In waalak' peek'" ("My Dog"), a light-hearted, beautifully edited music video on his YouTube channel *Lengua y Cultura Maya Yucateca*. The video, sung in Yucatec Maya, is an ode to the relationship between a man and his dog, and it made me smile instantly, thinking of my own pets. Its humor, rhythm, and color were striking, not only as a pedagogical tool but as an act of cultural presence. It was a gentle yet powerful reminder that language lives in everyday joys, and that digital media can make that life visible, joyful, and shareable.

Didier, who holds a degree in Linguistics and Mayan Culture along with postgraduate studies in ethnography and intercultural education, works to teach Yucatec Maya as a second language and to train others in linguistics and ethnographic approaches. He is also a certified translator and interpreter between Spanish and Maya, and sees language not only as an academic focus but as a living tool for communication, expression, and belonging. In our conversation, he spoke about the need to normalize and document Mayan language use in digital contexts, especially for younger audiences. Many children, he noted, associate Maya only with home or private spaces, and don't see it as something they can take with them into schools, public life, or the internet.

This invisibility, he emphasized, is not accidental. It is the result of long-standing discrimination and linguistic devaluation, which has led many to stop speaking Maya altogether or to avoid passing it down to their children. He sees digital platforms not as saviors, but as opportunities, if shaped intentionally, for documentation, education, and creative production. Like Catalino and Alfredo, Didier also believes that current efforts must target children and youth, and that they must go beyond translation or preservation to actively create joyful, dynamic content that reflects Maya realities and voices.

What stood out in our exchange was Didier's openness to linguistic change. While some activists advocate for "pure" forms of Maya that avoid the incorporation of Spanish loanwords or modern expressions, Didier takes a more adaptive stance: "The language is wise,"

he told me. Languages, he argues, evolve by responding to need, use, and creativity. He sees this not as a loss, but as an affirmation that Maya is still functional, fluid, and alive.

He also raised critical points about metrics of visibility. While Yucatec Maya is estimated to have around 700,000 speakers, Didier explained that census data can be misleading. Many people may speak Maya fluently yet not identify as Indigenous, whether out of stigma or because the term itself feels imposed. This disconnect between identity, language, and visibility further complicates digital engagement, where content in Maya still struggles to gain reach, and where algorithms rarely amplify Indigenous voices.

Didier's commitment is both linguistic and cultural, practical and imaginative. He is not only documenting a language but showing how it sings, plays, and lives. His work invites a new generation to see Maya not as a language of the past, but as one of the present and the future. In our conversation, he reminded me that digital activism is only beginning to tap into its potential. Like the others, he emphasized that it's not only about technology, it's about changing how people think about language, identity, and their right to be heard.

3.3.3 *Tsikbal*:speaking, listening, and remembering

Where Didier emphasized digital creativity and visibility, Felipe de Jesús Kuyoc Arceo centered our conversation on memory, voice, and the urgency of documentation. When I spoke with Felipe, our conversation turned quickly to voice, not only in the metaphorical sense, but in the auditory one. Felipe is the creator of *Tsikbales* ("Stories"), a podcast dedicated to preserving and sharing stories, word games, and ancestral knowledge through interviews with elders in his community. For him, podcasting is a "noble" format—accessible, flexible, and rooted in oral tradition. It allows for low-barrier entry into digital production, yet he is acutely aware of the challenges of scale and sustainability. His long-term vision is to build a community radio, one that could anchor cultural and linguistic life more robustly and serve both older and younger generations.

Radio, he explained, still holds significance for many adults in his community, as there's a habit of tuning in. But reaching youth requires different strategies, especially when the broader digital environment is shaped by algorithms and formats that often marginalize Indigenous content. His hope, though, extends far beyond media platforms: he envisions a future in which people can truly "live their lives in Maya", a world in which daily communication, access to information, and education, can all happen in one's mother tongue.

Felipe's reflections offered both optimism and urgency. He spoke about how Maya is often included in schools, yet taught in ways that are disconnected from other subjects or life contexts. It is "divorced," he said, from Spanish, rather than integrated. One language is prioritized, the other made optional. At home, however, it's different. He told me how his mother prefers to speak Mayan, and how his father's Spanish is textured by Maya grammar,

proof of the deep interweaving of linguistic worlds. For Felipe, the Maya language is not simply spoken; it shapes how one sees, relates, and remembers.

His project can be understood not simply as a media initiative, but as a continuation of the ancestral Maya practice of *tsikbal* a relational mode of storytelling, memory-sharing, and knowledge-making. In Yucatec Maya, *tsikbal* means not only story, but also to converse, recount, or narrate. However, it is not only about speaking. It is about sharing meaning across generations, in spaces of trust and reciprocity, where affect, gesture, silence, and memory all participate in the telling (Cocom, Cal, and Ramos 2016). Tsikbal is also foundational to the Maya literary renaissance, beginning in the late 20th century, where a new generation of Maya authors has refunctionalized oral tradition into diverse literary genres (Ligorred 2016).

Furthermore, tsikbales can be understood both a literary form and a socio-political tool: a form of resistance and resurgence that traverses genres (songs, essays, stories, theatre) and platforms (oral storytelling, printed texts, and now digital media) (Ligorred 2016). In contemporary Yucatán, scholars and intellectuals like Ana Patricia Martínez Huchím and Hilaria Máas Collí continue to affirm the pedagogical function of oral literature, demonstrating that storytelling remains a vibrant, evolving act of cultural preservation and resistance (P. Worley 2015).

Tsikbal is a living cord (*kuxa'an suum*) that binds generations together through memory, storytelling, and linguistic presence (Ligorred 2016). In naming his podcast Tsikbales, Felipe invokes this deep cultural lineage, reclaiming storytelling as a tool for community affirmation and continuity. The urgency he feels around documentation is also personal. His grandfather was a storyteller whose tales filled Felipe's childhood. But many of those stories now live only in fragments: a phrase here, a tone there, scattered memories across time. Some have faded with his grandfather's passing. "What is not preserved now," he said, "may be lost in the future." This sense of fragile continuity runs through his work, not as nostalgia, but as responsibility. Felipe is not simply preserving stories, he is activating and sharing them in new formats while remaining grounded in oral tradition. His work is a clear example of how tsikbal functions not only as a narrative method, but as an epistemological and political stance: one that resists erasure, re-centers Maya voice, and affirms language as a vehicle for living, imagining, and remembering. By interviewing elders and recording stories that might otherwise remain fragmented or forgotten, Felipe extends the life of tsikbal into the digital age, ensuring that it continues to do what it has always done: connect, sustain, and ignite.

When I mentioned that other collaborators had spoken of a sense of disconnect from the past, Felipe paused. In his own community, he said, that wasn't exactly the case. People valued their roots. The past was present, not always as conscious recollection, but as ritual habit, embodied knowledge, and unbroken practice. "Sometimes they don't remember when they started doing rituals," he said. "It's just something they've always done." This

speaks to a different kind of continuity, not one built on formal education or documentation, but on lived repetition and community rhythm. Still, he acknowledged that proximity to urban centers may shape other communities differently, and that cultural disconnection is unevenly felt.

Like Didier, Felipe is familiar with debates around linguistic purism in the sphere of language activism. He agrees that languages evolve, absorb, and adapt. For him, this is not a flaw but a sign of vitality. His commitment is to ensure that Maya continues to evolve in ways that are grounded in community voice: passed across generations, and embedded in everyday life.

3.3.4 Insights and Ideas

Across the four conversations, several recurring themes emerged that not only resonated with one another, but converged to shape the direction of this project. Each of them, in their own way, emphasized the living nature of language, and the need for creative, everyday uses that reflect its fluid, present-tense relevance. They also pointed to a disconnect not from cultural value per se, but from institutional support, visibility, and narrative authority. Digital activism, for all its promise, was described as both empowering and limited, especially in spaces like social media where Indigenous voices rarely go viral, and educational content struggles for traction.

Notably, they all shared a focus on children and youth. Whether through podcasting, music, workshops, or visual storytelling, each collaborator expressed concern for the generational transmission of language, values, and knowledge. They all saw creative engagement, especially fun, relatable, and stimulating formats, as essential for ensuring that Maya language and culture continue not only to survive, but to thrive. The message was clear: cultural revitalization requires formats that meet young people where they are; on their phones, on their feeds, and in their imaginations.

Seeing this shared emphasis on children, engagement, and storytelling, and knowing that Alfredo had used games in his workshops before, I began to think about how digital media could be used not just to present the codices, but to invite children into them. What if there were a way to not simply look at images of the codices, but to enter them: to choose a path, become a character, and navigate the world they depict? This is how the idea of an interactive storytelling game emerged from the conversations and insights shared by those doing the work of cultural transmission every day.

I contacted both Alfredo and Catalino to ask if they would be interested in co-developing this idea with me. They both agreed. In turn, Catalino introduced me to two more collaborators whose perspectives and creativity would help expand and diversify the project: Gladys Susana Mis Dzul and Esther Abisag Aguilar Tziu.

Gladys, originally from Santa Cruz Pueblo, Calkiní, Campeche, studied gerontology at

the Autonomous University of Campeche and is currently pursuing a degree in Mayan Language and Culture at the Intercultural University of Campeche. She shares videos and images in Mayan through her social media project *U Mootsil K-maayat'aan* ("The root of our Mayan language") across Instagram, Facebook, and TikTok. Her work is visual, accessible, and rooted in cultural affirmation, making her an ideal contributor to a project that seeks to bridge heritage and contemporary media.

Abisag, who leads the project *KI'KI'KUXTAL* ("Good Life"), was born in Cancún but raised in close connection to agricultural and artisanal traditions. In an article for Rising Voices she shares that her grandfather told her stories after coming home from the cornfield, her mother wove hammocks, and her aunt embroidered huipiles (Tziu 2023). Now studying to become a teacher, Abisag speaks of loving music, movies, and webtoons just like many people her age, but she also feels a very close connection to her culture. She notes that in her community, La Esperanza, fewer children and youth speak Maya, not necessarily because they reject it, but out of habit and convenience. "Although we understand and know how to speak it," she writes, "sometimes we prefer not to. But it's so beautiful when we communicate in Mayan." (Tziu 2023). Her project shares traditional recipes, medicine, and sweets, all narrated in Maya and translated into Spanish, combining digital visibility with community engagement by screening the videos at local events before posting them online.

The projects and practices of these activists align closely with what scholars like Martens, Venegas, and Tapuy (2020), Armenta (2021), and Cru (2024) describe as a growing field of Indigenous digital reimagination. Far from passively adopting technology, they are actively reshape digital platforms to reflect Maya epistemologies, communal priorities, and pedagogical needs. Whether through podcasting, music videos, workshops, or multilingual social media content, their work embeds ecological, spiritual, and intergenerational relationships into digital form. Like the community media initiatives described by Martens, Venegas, and Tapuy (2020), these efforts challenge the individualistic and commercial logics of mainstream platforms, transforming them into spaces for togetherness, learning, and safe-keeping.

Importantly, these creators also push back against the isolating or extractive tendencies of social media, refusing to treat it as an end in itself. Alfredo, for example, pairs his digital content with in-person epigraphy workshops, grounding online engagement in community-based learning; and Abisag makes content creation a community event through her local screenings, using the digital not just to disseminate, but to gather and affirm community presence. These practices reimagine platforms like Facebook and TikTok not as sites of passive consumption, but as extensions of relational care and cultural autonomy. Such uses of digital space foster a dynamic, collective "Indigenous digital identity" (Armenta 2021), that is visible in the connections that exist between the activists themselves and that they were kind enough to share with me by introducing me to their colleagues. In centering visibility, dialogue, and local knowledge, these activists are not simply pre-

serving culture—they are remaking what it means to live, speak, and share Maya identity in digital and communal time.

ashes

In *Los Abuelos* (Gómez 2012), Ermilo Abreu Gómez recounts a moment of transformation from the Popol Vuh: ”They took the remaining bones from the ashes, tied them with pita thread, and threw them into the river” This passage describes a crucial moment in the narrative, where the twin heroes, Hunahpú and Xbalanqué, are apparently defeated by the lords of Xibalbá (the underworld), who burn their bodies and scatter their remains. However, this was not the end for Hunahpú and Xbalanqué. From the ashes and the river, their bones were transfigured; they returned in new forms to continue their defiance of the lords of Xibalbá. In their final metamorphosis, they became the Sun and the Moon, celestial forces that continue to illuminate humanity. Their story speaks of resilience and regeneration; showing how memory, even in fragments, can be reanimated and transformed.

This chapter emerges in response to the previous one. If Flames represented the ignition, a look into the ongoing challenges of epistemic authority, then Ashes turns to what endures and what might yet be reimagined. From Remnants to reimaginings, ashes are what remain, but they are also what can be gathered, reshaped, and rekindled. Through storytelling, co-design, and the playful reactivation of cultural memory, this chapter explores the challenge of bridging historical distance and digital presence. It centers the development of a collaborative storytelling game prototype as an experimental act of ”virtual repatriation” or renewal; an effort to tie bones with string and cast them once more into the current, where they may live again.

4.1 The Engagement Gap: Disconnect Between Codices and Contemporary Audiences

The Maya codices, testaments of celestial rhythms, ceremonial cycles, and ancestral memory,survive in fragments, often severed from the worlds that once animated them. Gently spread out behind protective panes of glass, kept under strictly controlled climate conditions, or pixelated through digital archives, they exist. And yet, for many contemporary Maya, they are absent. This paradox of presence without connection is at the heart of the engagement gap.

What has been preserved materially has often also been detached epistemologically. The codices are not necessarily inaccessible because they are physically out of reach; all four of them have, to different degrees, been scanned, cataloged, and exhibited. They are inaccessible because the frameworks through which they are presented rarely reflect or include the epistemologies from which they emerged. To speak of "digital access" to the Maya codices without accounting for history is to misname a tear as an edge. The distance many contemporary Maya feel toward these documents is not due to indifference, but to a long history of epistemic erasure.

This erasure is not a passive forgetting, but an active process rooted in systems that grant visibility and legitimacy to some forms of knowledge, while disappearing others under the guise of objectivity or progress (Berenstain et al. 2022). Modernity's dominant regime of knowledge operates through a logic of translation as erasure: it demands that other ways of knowing be made legible on its own terms, through its own structures of classification and recognition (Vázquez 2011). In settler colonial contexts, this has resulted in epistemicide through the systematic suppression of Indigenous knowledge systems through educational, linguistic, and archival violence (Sousa Santos 2015). Under this logic, indigenous ways of knowing are either excluded from the "parameters of legibility" (Vázquez 2011) of modern epistemology or stripped of their relational and embodied meanings when incorporated into it.

This is a logic that the codices, like many other cultural artifacts have been subjected to. They are digitized, classified, and studied—but rarely situated within the living practices or epistemic frameworks of the communities from which they emerged. In this context, the codices appear not as living texts, but as artifacts: valuable but voiceless, interpreted primarily by academics, and often stripped of the relational, oral, and ceremonial contexts that gave them meaning.

In my conversations with the digital activists, this disconnect was expressed not in abstract terms, but as a daily tension. Alfredo noted that people in his epigraphy workshop's often expressed wonder at seeing their ancestors following practices that are still alive. These moments of recognition can be powerful, but they did not emerge from institutional channels. It was in a space of trust, guided by a facilitator who understands the importance of embodied and emotional knowledge. Having worked in museums and within Maya communities, Alfredo emphasized that for many, the codices have been framed in ways that feel abstract, closed, and disconnected from everyday life.

Catalino and Didier also pointed to a different dimension of the gap: the unequal digital terrain in which Maya language and knowledge are now circulating. Rural Maya communities don't always have reliable internet access, and there's also the issue of what content is prioritized by social media algorithms. The deeper question is both technological but epistemic: how to make digital tools serve community needs without reproducing the asymmetries of power and knowledge that have historically silenced Indigenous

voices.

These conversations all shared in the insight that culture is not inert or passive. Felipe, for example, uses podcasting as both a medium and a method; an extension of a living oral tradition into new digital forms. He is not treating tsikbales as content to be translated, but as Knowledge to be transmitted and cared for communally. The codices too are not just historical documents to be decoded and studied, but cultural artifacts that require relational engagement.

Closing this gap is not as simple as providing translation or context. Virtual repatration, if it seeks to trully engage in acts of ”return”, need to shift the terms of engagement and recognize that communities of origin are not passive recipients of their heritage, but active epistemic agents capable of interpreting, transforming, and reanimating it. Doing so requires not only new platforms, but new relations. In this sense, the development of the prototype for this project was an probe into co-designed spaces in which digital heritage can be returned not only as images, but as interlocutors.

Yet for such a return to be meaningful, it must take place within the epistemic frameworks that have always sustained cultural transmission in Maya communities, frameworks rooted not in archival logic, but in storytelling, memory, and relational voice.

4.2 Storytelling as Cultural Transmission

At the beginning of this chapter, I referred to the story of Hunahpú and Ixbalanqué. Their journey, drawn from the Popol Vuh, speaks not only of transformation and resilience, but of the power of story to carry memory across thresholds of death, erasure and time. The Popol Vuh itself, though committed to writing in the colonial period, is deeply rooted in older oral traditions (P. Worley 2015).

In the words of an elder who listened to a couple of pages about the creation of the world in the Popol Vuh: “These are the words of my ancient fathers? Do you know what you have done for them? You make them live again by speaking their words.” (Christenson and Meléndez 2012). This notion of storytelling as an act of resurrection speaks to its centrality not only in cultural transmission but in epistemological resistance

It is profoundly meaningful that the hero twins ultimately become the sun and the moon. Their final transformation is not a resolution to their epic journey, but a return: In becoming the celestial lights, they move from mythic protagonists to cosmic constants, guiding time, planting cycles, ritual calendars, and human perception. In this sense, the sun and the moon are not passive markers of time, but active agents in a universe that is alive and connected. This cosmological gesture echoes the broader Maya understanding of time as cyclical. Rather than a single creation event, the Popol Vuh speaks of a cycle in which different worlds are built and unbuilt.

In this worldview, destruction is not final; it is a prelude to transformation, a necessary moment within an ongoing rhythm of becoming. This cyclical understanding of time reframes storytelling not as an act of preserving a fixed past, but as a practice of re-entering and reanimating it. Just as Hunahpú and Ixbalanqué reemerge transformed, so too do stories. Each telling is also an act of return.

Storytelling, then, becomes a mode of continuity. Memory resists erasure, not through linear chronology, but through what Cocom, Cal, and Ramos (2016) call the triad of *olvido, recuerdo, y memoria* (oversight, recollection, memory): a loop of forgetting and remembering that unsettles the colonial insistence on fixed narratives and instead allows stories to breathe, shift, and survive in the lives of those who tell them. In this triad, memory refers to the enduring presence of ancestral knowledge, embedded in collective consciousness and communal practice. Recollection is the situated act of remembering, something that arises in conversation and in daily life, shaped by context and affect. And oversight, far from being a passive absence, signals the silences, interruptions, and layers of forgetting that are also part of how knowledge lives; an active part of memory's cycle as space of silence, or what hasn't been voiced yet. It includes the residues of colonization, trauma, or suppression, but also the possibility for remembering anew. Together, they mark storytelling as a dynamic process that aims not to preserve a static past but to move through it.

This relational, affective, and cyclical structure of tsikbal is not only a method of knowledge-sharing, but also vehicle for cultural continuity. As contemporary writers refunction oral tradition into new poetic, theatrical, and narrative forms, storytelling serves as the living cord that sustains memory even after rupture (Ligorred 2016). Tsikbal, as a methodology, allows for what Cocom, Cal, and Ramos (2016) call "the reverberation of the word", dialogic flow in which stories are felt, remembered, forgotten, and re-formed in their telling. In doing so, tsikbal becomes a decolonial method: one that challenges extractive research and re-centers Indigenous ways of knowing through the act of speaking, listening, and remembering together.

The work of Ana Patricia Martínez Huchim –a Yucatecan Maya writer, linguist, anthropologist, and cultural promoter– brings these dynamics into focus by grounding cultural elements in women's voices and modern issues. Her storytelling, shaped by "retrofuture memory", a spiral conception of time in which memory moves both backward and forward, drawing from ancestral knowledge and inserting it into different temporalities to comfront the present and imagine futures (Ferrera-Balanquet 2019). This is made vividly clear in her novel *U k'a'ajsajil u ts'u' noj k'áax* (Memories from the heart of the mountain) (Huchim 2013), which intertwines Mayan tradition with contemporary issues such as gender violence, social inequality, and disconnection from land and community.

The novel follows *xTuux*, (the one with the dimples) a woman who, in her last days, reminisces about her time in the *chiclero* encampments, where raw material was extracted

for chewing gum production primarily the jungles of Quintana Roo and Campeche. The narrative is not organized chronologically. Rather, it flows between memory, song, and stories reflecting the circular temporality and orality typical of Mayan tradition. As P. M. Worley (2019) notes, Martínez Huchim's narratives are acts of cultural labor, grounded in what Maya communities understand as *páay meyaj* or collective work, emphasizing that language itself is a communal resource, and that its survival and expression require collaborative effort.

In this light, storytelling is not only a means of preserving knowledge but a method of activating it—a cultural technology through which memory becomes actionable, identity becomes lived, and history becomes a tool for navigating the present. Its cyclical temporality, dialogic structure, and capacity to carry ancestral voices across generations make it uniquely suited for contexts where cultural continuity has been threatened by silencing and fragmentation. This is why, when imagining how to create meaningful encounters with the codices, it became clear that storytelling should structure rather than accompany the project. The development of an interactive storytelling game was more than a stylistic decision; it was also an epistemological one, grounded in the belief that the most faithful way to revitalize these fragments is not to explain them, but to let them be spoken, lived and shared again through narrative.

4.3 Gamification in Cultural and Historical Contexts

Across my conversations with the Maya digital activists, a shared theme emerged: the codices and other historical materials often feel distant or irrelevant—not because of disinterest, but because of the forms through which they are typically encountered. From Alfredo's description of an identity gap, to Catalino's reflections on digital exclusion, to Felipe's emphasis on oral memory and Didier's playful pedagogy, each collaborator pointed to the need for interactive, culturally grounded, and participatory formats.

What these conversations reveal is a deeper epistemic gap: a disjuncture between the ways heritage materials are framed, accessed, and circulated, and the ways they are meaningfully engaged within the communities from which they originate. This gap is not only technological or generational, but epistemological—it concerns whose ways of knowing are centered, how knowledge is encoded, and what forms of engagement are made possible. Despite growing efforts to digitize and preserve cultural artifacts—a trend that gained momentum in the 1990s alongside the rise of digital technologies and the expansion of online museum collections (Cameron and Kenderdine 2007; Parry 2007)—a persistent disconnect remains between historical materials and the contemporary publics they are meant to serve. For many, especially younger audiences and members of historically marginalized communities, heritage artifacts, no matter how beautifully rendered or carefully archived, often feel abstract, static, or emotionally inaccessible.

Closing this gap requires more than display or translation. It calls for participatory approaches that restore agency to users and allow them to encounter heritage not as passive viewers but as active participants. This is where gamification—the use of game design elements to create interactive, choice-driven experiences—offers both a strategic and culturally resonant pathway. When rooted in co-design and community engagement, gamification can reframe historical objects as living interlocutors (Marques et al. 2022; Bonacini and Giaccone 2022).

This shift happens through several key mechanisms. First, co-design centers community epistemologies, allowing those most intimately connected to the heritage in question to shape how it is represented, narrated, and interacted with. Rather than being interpreted from the outside, cultural objects become embedded in narratives and interactions that reflect the values, humor, memory, and affective textures of the communities from which they come. Second, gamification introduces structured choice and symbolic movement, allowing players to enact decisions, follow branching paths, and explore meanings rather than receive them. In doing so, the user's relationship to the object is no longer passive or linear. Instead, it becomes dialogic, where interpretation arises through interaction. Third, through feedback loops, narrative consequence, and participatory immersion, gamification fosters a sense of responsiveness. Objects are no longer merely representative: they react, shift, and open up new pathways. The codices, in this sense, could cease to be closed books and become open spaces of cultural possibility rather than historical finality. Finally, involving communities in the design of these systems ensures that the voices embedded in the artifact are not overwritten but amplified. This participatory resonance gives the object a voice not just through words, but through the logic of the game itself.

This interactive logic is not foreign to Maya culture. As discussed in the previous section, *tsikbal* is not a static act of transmission, but a relational, affective, and often playful exchange. Knowledge is not simply passed down but co-created in the moment of narration. In this sense, gamification does not impose an external structure on heritage, it amplifies existing epistemological practices. The affordances of game design such as branching narratives, choices, feedback, and progression, mirror the narrative techniques embedded in oral storytelling. Maya stories, like games, unfold in spirals, offering multiple outcomes, embedded lessons, and shifting roles between speaker and listener. In this sense, designing a storytelling game grounded in Maya narrative structures is not a gesture of translation but of alignment—as Singh, Roy, and Padun (2024) suggest, when game mechanics are shaped by the symbolic and dialogic logics of the source culture, gamification can mirror and extend traditional epistemologies rather than displace them.

Successful examples from other cultural contexts illustrate the potential of gamification when designed with care, community participation, and cultural specificity. In Italy, the game *Mi Rasna* was developed to educate and engage the public with Etruscan civilization. Rather than following a linear narrative, the game places players in the role of a *lucumon*, a local Etruscan magistrate, tasked with managing the development of twelve

cities. Through this role, players navigate decisions about agriculture, trade, construction, and civic life—gaining insight into Etruscan society through strategic engagement. The game invites users to "live as if they were Etruscans", and over two and a half years it garnered the attention of more than 735,000 viewrs (Bonacini and Giaccone 2022), demonstrating how historical content can be made accessible through such methods. Bonacini and Giaccone (2022) emphasize the importance of participatory models in which cultural institutions move from passive content holders to co-creators. In this view, gamification becomes meaningful only when grounded in collaborative design, where the community shapes the content, structure and aesthetic of the experience.

Similarly, in India, the Woven Memoir project, described by Singh, Roy, and Padun (2024) uses gamification to preserve and transmit the oral and textile traditions of the Ao Naga people. Players interact with non-player characters (NPCs), complete quests, and unlock content that reflects the rhythms and ethics of the community. Crucially, both projects emerged from collaborative processes, with local experts and community members shaping not only the content but also the narrative logic and aesthetic design. These cases show that when gamification is rooted in community-led co-design, it does more than entertain: it becomes a medium for cultural continuity, reanimating artifacts, practices, and worldviews that might otherwise remain obscured or fragmented.

In the context of historical education, gamification has been shown to promote deeper engagement, enhance critical and creative skills, and aligns with the learning needs of digital-age students. In a study by Moseikina, Toktamysov, and Danshina (2022) students reported greater motivation, satisfaction, and academic performance. Furthermore, when combined with immersive technologies such as AR or VR, these environments become even more effective in enhancing memory, emotional resonance, and reflective thinking by transforming passive consumption of information into an interactive experience (Eleftheria et al. 2013). In this way, digital tools can both enhance motivation ans offer entry points into cultural memory, especially in contexts where conventional education may not address marginalized histories.

In this project, the decision to create an interactive storytelling game was rooted in these concerns. It was not just about increasing attention or making the codices more entertaining, but about developing a digital form that honors the epistemic, temporal, and relational dimensions of Maya storytelling. By drawing from tsikbal and engaging Maya collaborators as co-designers, we imagined a game with the goal to recreate not a faithful simulation of the codices, but a living encounter with their logic.

4.4 Voices in the Fire: Participatory Development of the Game

The foundation of this project was conversation–open-ended, relational, and sometimes fragmentary that shaped the prototypes logic. Across the early conversations, several shared priorities surfaced.First, there was a clear and urgent desire to engage youth by meeting them within the digital spaces they already inhabit. Catalino emphasized the increasing presence of Maya youth on mobile and social platforms, while Felipe and Didier spoke about the importance of making cultural materials feel relevant and alive. Second, there was consensus on the need to center storytelling as both method and meaning. Whether through Alfredo's workshops, Felipe's podcast, or Catalino's ceremonial recordings, storytelling was consistently framed not as a container for knowledge, but as the knowledge itsel: a way of thinking, remembering, and belonging. Third, collaborators warned against approaches that felt overly didactic or instructional. Some young people feel disconnect from Maya language and culture when it is presented too rigidly or formally; in response, Didier advocated for formats that are playful, humorous, and emotionally resonant.

4.4.1 the first meeting

Our first full team meeting brought together Alfredo, Catalino, Gladys, Abisag, and myself over a long video call, shared across a seven-hour time difference. I was well into the afternoon and their day was just starting, but there was an overall air of anticipation on the call.

The group, brought together through the initial conversations I shared with digital activists and Catalino's network, represented four Mexican states: Yucatán, Quintana Roo, Campeche, and Chiapas. By including Abisag and Gladys, both younger digital activists from different regions, Catalino hoped to expand the plurality of Maya voices shaping the project. The first question, posed thoughtfully by Alfredo, was deceptively simple: *¿Qué vamos a hacer?* ("What will we do?"). It set the tone for a process rooted not in prescriptive agendas but in collective imagining. The group expressed a shared excitement about the opportunity to tell stories and experiment with a medium that had not yet been widely used in Maya contexts: gamified narrative. I suggested using Twine, an open-source platform for creating nonlinear, interactive stories that function like digital choose-your-own-adventure books. It allows users to create branching narrative structures without coding experience, making it a good entry point into digital game design.

One early idea was to pose a kind of challenge or quest that would guide players through Maya stories and legends. However, discussion quickly turned toward a deeper question: how could the game also connect to contemporary life? Alfredo, who has the most experience working directly with the codices, proposed using the Madrid Codex as our narrative

foundation, noting that it contains depictions of cultural practices such as rituals, agriculture, and cosmology that remain alive in many communities today. He envisioned the codex as an interactive interface, where players could click on glyphs to enter their meaning, and proposed demystifying the calendar system to make it more legible to broader audiences. His idea was to render the codex "readable" in both Spanish and Yucatec Maya, making it accessible to more people while still encouraging the use of Mayan in spaces such as this.

While everyone showed interest in this proposal, some participants voiced uncertainty about how they could meaningfully contribute, given their limited familiarity with the codices. In response, Alfredo offered to lead a basic introduction to Maya glyphs and codices, a proposal that was warmly accepted. At the same time, the group expressed a desire to be hands-on with the process, not just contributors of content. To support this, I offered to guide everyone through the basics of Twine so that we could all begin to experiment and think through possibilities together. Both presentations were scheduled for the following weeks, and we agreed to reconvene afterward to share reflections and develop design directions once everyone felt more comfortable with both the narrative materials and the interactive platform. That first meeting didn't produce a finished idea, but it produced something far more important: a shared rhythm of collaboration, grounded in mutual curiosity and a commitment to co-creation.

4.4.2 Learning and Ideas

When we met again for the learning sessions, the tone remained collaborative and exploratory. Alfredo led our first workshop, introducing us to the logosyllabic structure of the Maya writing system. Rather than delivering a lecture, he guided us through the session in conversation, encouraging everyone to guess the meaning of various glyphs. Many were surprisingly intuitive, we were able to guess some like fire and tamales. It was easy to see how, while formal literacy was historically restricted to the elite, the writing system itself was so visual and symbolically rich that broader segments of the population could still engage with it—especially through monuments and ritual spaces. The experience was grounding; it gave us a deeper understanding of the glyphs as writing, not just ancient puzzles, but words that carry everyday meaning, and it also gave us a better look at the aesthetics of the written word as art.

In the following session, I walked the group through the basics of Twine, showing how to create and save a story, build branching and looping narrative paths, and customize elements like font, color, and image integration. We explored the no-code tools, but also discussed the potential for adding music, animation, and more complex interactivity through lightweight coding. Catalino, ever the teacher, lit up at the possibilities: he said he could easily imagine using Twine to design more engaging lessons for his students. Abisag shared that she quickly grasped the logic of the interface by relating it to the mind maps she of-

ten builds for her university studies. These sessions expanded our technical and cultural toolkits and helped build confidence, laying the groundwork for a design process where everyone could contribute actively.

Armed with this new tools, we set out to brainstorm. We created a shared document on Google Drive and started writing down our own ideas and building up on the ideas of others. The ideas that emerged reflected a shared interest in honoring ancestral knowledge while grounding it in contemporary lived experience. Alfredo pointed to several panels in the Madrid Codex depicting agriculture and maize-related rituals: ceremonies tied to planting cycles, offerings to deities, and seasonal observances essential to Maya cosmology. These scenes sparked ideas about connecting past and present through the voices of modern-day farmers, who could speak to changes in planting, climate, and maize consumption.

Another panel depicting bee management and ritual offerings tied to the 20-day calendar cycle prompted conversation about traditional melipona beekeeping, its spiritual significance, and the loss and revival of this practice today. Cooking and food preparation also emerged as a compelling thread—especially maize-based dishes, which appear throughout the codex and are a staple of modern cuisine as well. The group saw potential in creating a story path that weaves between ancient food offerings and contemporary stories of cooks, home recipes, and community gatherings. Finally, the codex's depictions of weaving and craft-making could open space for a narrative focused on textiles, inviting modern stories of weavers, artisans, and the labor of hands across generations. At the end we decided to create a story that allowed the player to follow the journey of the codex and then branched out into different paths that connected an aspect of the knowledge contained in the codex to modern day life.

4.5 Design methodology

Four Dimensional Framework	
Learner Specifics	**Pedagogy**
Profile	Associative
Role	Cognitive
Competencies	Social/Situative
Representation	**Context**
Fidelity	Environment
Interactivity	Access to learning
Immersion	Supporting resources

Figure 4.1: The four-dimensional framework, Source: De Freitas, Rebolledo-Mendez, et al. (2010)

A growing body of literature has proposed structured frameworks to guide the development of educational games, particularly those that aim to balance engagement with meaningful learning outcomes. Among the most widely used is the Four-Dimensional Framework (FDF) developed by De Freitas and Jarvis (2006) which offers a holistic approach to designing and evaluating game-based learning experiences. Other models have emphasized motivational and structural integration, such as the Conceptual Framework for Educational Games by

Yusoff (2010) , which focuses on embedding instructional content, game mechanics, learning outcomes, and reflective activities into the design. Meanwhile the Design, Play, Experience model by Salen and Zimmerman (2004) brings attention to how learners emotionally and cognitively engage with a game through narrative, gameplay, and feedback, reinforcing the idea that meaningful play emerges from carefully layered experience design.

In comparing these models, Malliarakis, Satratzemi, and Xinogalos (2014) argue for a more comprehensive approach, proposing the CMX framework (named after the authors), which synthesizes principles from all three. Their model emphasizes aligning pedagogical objectives with gameplay, mapping user roles, and embedding reflection and adaptability throughout the system. While the CMX model is particularly useful for larger-scale, multi-role learning environments, the FDF was especially well-suited to this project due to its emphasis on context, cultural alignment, and pedagogical coherence. Moroever, the FDF is particularly appropriate for early-stage, exploratory, or prototyping contexts because it is flexible, reflective, and non-prescriptive.

Thus, the FDF's structure allowed us to center Maya youth as learners, to ground the experience in relational and non-linear storytelling traditions, and to design within the technological and cultural constraints of informal digital contexts. It also offered the flexibility to incorporate constructivist and situative pedagogical models that align closely with tsikbal. In this way, the FDF helped shape the prototype in a culturally resonant way.

The FDF is composed of four interdependent dimensions (De Freitas, Rebolledo-Mendez, et al. 2010:

- 1-Learner Specification: This dimension addresses the characteristics and needs of the target learners, including their age, digital literacy, prior experience with games or immersive technologies, motivations, and cognitive styles. Understanding the learner is central to designing adaptive, accessible, and emotionally resonant experiences. The framework emphasizes personalization, feedback, and alignment with user expectations.
- 2-Pedagogical Model: The pedagogical dimension focuses on the learning theory underpinning the experience. It distinguishes between associative, constructivist, and situative models. Drawing on Dabbagh (2005) these three major perspectives can be distinguished as follows: the associative model, which treats learning as the acquisition and reinforcement of structured knowledge; the constructivist model, which emphasizes active meaning-making through exploration and reflection; and the situative model, which understands learning as a socially and culturally situated process that unfolds through participation and interaction. This dimension helps define the type of learning outcomes targeted—whether task-based, reflective, collaborative, or

transformative.

- 3- Representation: Refers to the immersion level, fidelity, and type of interface used. Considers how learners interact with the environment and the narrative world. Notes that graphics, interface usability, and learner expectations shape engagement.
- 4- Context: The context dimension considers where and how the learning takes place—whether in formal (e.g., school), non-formal (e.g., museum), or informal settings (e.g., home or mobile environments). It also includes the institutional, cultural, and technological constraints that may shape implementation. This dimension ensures that the learning experience is realistically grounded and deployable within existing structures.

The FDF encourages designers to consider how these dimensions intersect. For example, the choice of pedagogical model will influence how representation is implemented, and the learner profile will affect how the context and interaction are framed. Together, the framework supports a holistic and reflexive approach to game development, ensuring that learning is not only effective, but also contextually and culturally meaningful.

4.5.1 Applying the FDF to the Prototype

Each of the four dimensions—learner, pedagogical model, representation, and context—offered a lens through which to assess design choices and ensure alignment with the cultural and epistemic aims of the project.

- **Learner**: The primary intended users of the prototype are young Maya people, particularly those between the ages of 12 and 25, who are increasingly fluent in digital media but may feel distanced from the codices or the formal study of Maya history. Many of these learners are digital natives with complex identities and diverse linguistic experiences. As such, the prototype needed to engage them in ways that reflect their everyday media environments while honoring their cultural and linguistic heritage. This meant designing an experience that was not overly academic or didactic, but emotionally resonant, exploratory, and visually meaningful. Based on conversations with collaborators like Catalino and Didier, it became clear that content should invite play, curiosity, and affective connection, allowing learners to interact with heritage materials without requiring prior familiarity. The goal was to make space for reflection, recognition, and even joy—providing learners with a tool that feels both familiar and deeply rooted in their own cultural knowledge systems.
- **Pedagogical Model**: In alignment with the method of *tsikbal*, the prototype attemps to incorporate some constructivist elements—encouraging players to build understanding through interaction— to a situative model of learning (Dabbagh 2005). The goal is for knowledge to be experienced, performed, and embedded in relationships. The game invites players to inhabit narrative roles, explore branching paths,

and engage with traditional knowledge as living practice—mirroring the structure of tsikbal, where learning unfolds through story, exchange, and situated presence. This pedagogical stance shaped both the structure of the narrative and the types of interactions designed. Rather than progressing linearly or completing isolated tasks, players move through a web of interconnected storylines, each rooted in a thematic thread drawn from the Madrid Codex—such as maize, bees, or stars.

Players are not asked to solve puzzles or answer quiz-like questions; instead, the idea would be to ask them to make decisions, navigate uncertainty, and interpret cultural cues embedded in images, words, and actions. For example, a player may choose whether to follow a path into the glyphs or a storytelling one, each revealing different aspects of Maya worldview. These decisions are not evaluated as right or wrong; rather, they reflect the relational and cyclical temporality of the codices themselves. The game would also include moments of pause where the player is invited to reflect, listen, or engage with voice or story fragments. These interactive elements are meant to mirror the experience of sitting with an elder, participating in ceremony, or walking through story, thus privileging presence, resonance, and connection over linear logics. In this way, the narrative becomes a learning space that cultivates participatory understanding through embodied and situated play.

- **Representation**: Because the game would be built on Twine, the representational layer has to balance simplicity with symbolic depth. Rather than relying on high-fidelity visuals, the game would use codex-inspired imagery, minimal animations, and color schemes to evoke the atmosphere of the Madrid Codex while remaining accessible to novice users. This also makes sense culturally, because in the Classic Maya tradition, writing was never a neutral or isolated system. It was deeply embedded within a broader visual and cultural logic, where text and image coexisted in a dynamic, interdependent relationship (Lama and Rivera 2017). Interactive glyphs, branching storylines, and contextual cues reflect the spiral narrative logic of the codices and Maya storytelling more broadly. Representation here is not about realism, but about affective and epistemic resonance.

  In one of our meetings, Alfredo proposed that instead of importing standardized glyphs, we create hand-drawn versions of selected glyphs, maintaining a sense of embodied authorship. He emphasized that even simplified renderings could retain cultural integrity while making the codices more approachable. Other collaborators suggested incorporating recorded audio clips of elders telling stories or performing ritual moments, to allow players to experience the cadence, voice, and affective tone of oral transmission. These layered forms of representation—visual, auditory, and interactive—seek not to simulate the codices as objects, but to reactivate them as relational practices, where knowledge is animated through voice, image, and movement.

- **Representation**: The game is thought out for informal educational settings, including classrooms, workshops, community spaces, or independent use. It is not embedded within a formal curriculum, but is meant to be adaptable, used by teachers like Catalino, cultural promoters like Abisag, or young users themselves. The context dimension also includes technological and linguistic realities: a functioning game would need to simple to account for low-bandwidth environments, multilingual settings, and the need to support both Spanish and Yucatec Maya. In this case, the flexibility of Twine and the narrative-based format would allow for customization and future expansion based on community feedback and use cases.

Taken together, the Four-Dimensional Framework provided a flexible structure through which design decisions could be made collaboratively and reflectively. Each dimension allowed us to consider not different aspects, from technical or pedagogical needs, to cultural, affective, and epistemic priorities—ensuring that the game remained grounded in Maya ways of knowing while accessible to contemporary users. Importantly, the framework's openness made it especially well-suited for a prototyping phase in which possibilities were still being explored rather than finalized. It helped us think relationally, rather than prescriptively, and supported a design process rooted in conversation.

4.5.2 Game Structure and Narrative Paths

Out of the brainstorming sessions, we devised a script for the game (See Appendix 1). The structure of this prototype is shaped by a branching narrative model, in which players choose between three paths—maize, star, or bee—each reflecting a different aspect of Maya culture as depicted in the Madrid Codex. This structure is intended to reflect the cyclical logic and the relational pedagogies found in tsikbal. Each path is written in the second person, inviting players not only to read about a symbol, but to embody it, and to journey through time as that living force.

Figure 4.2 provides a simplified visualization of the game's narrative structure, based on the current script. The game begins with the voice of the codex, which introduces the player to its history and poses the central question: "What are you today?"

The script opens with a prologue introducing the codex: it recalls its origins in the hands of artisans and priests, its journey across the ocean, and the silence that followed. The player then hears a voice asking: "What are you today?" From this moment, the player steps into a chosen identity. Each path follows a past–codex–present structure, guiding the player from mythic or ancestral origins to representations in the codex, and finally to contemporary practices that continue the tradition.

In the Maize path, the player follows the agricultural cycle of the milpa, learning about planting, ritual, seasonal care, and the enduring presence of maize in tamales, tortillas, and community life.

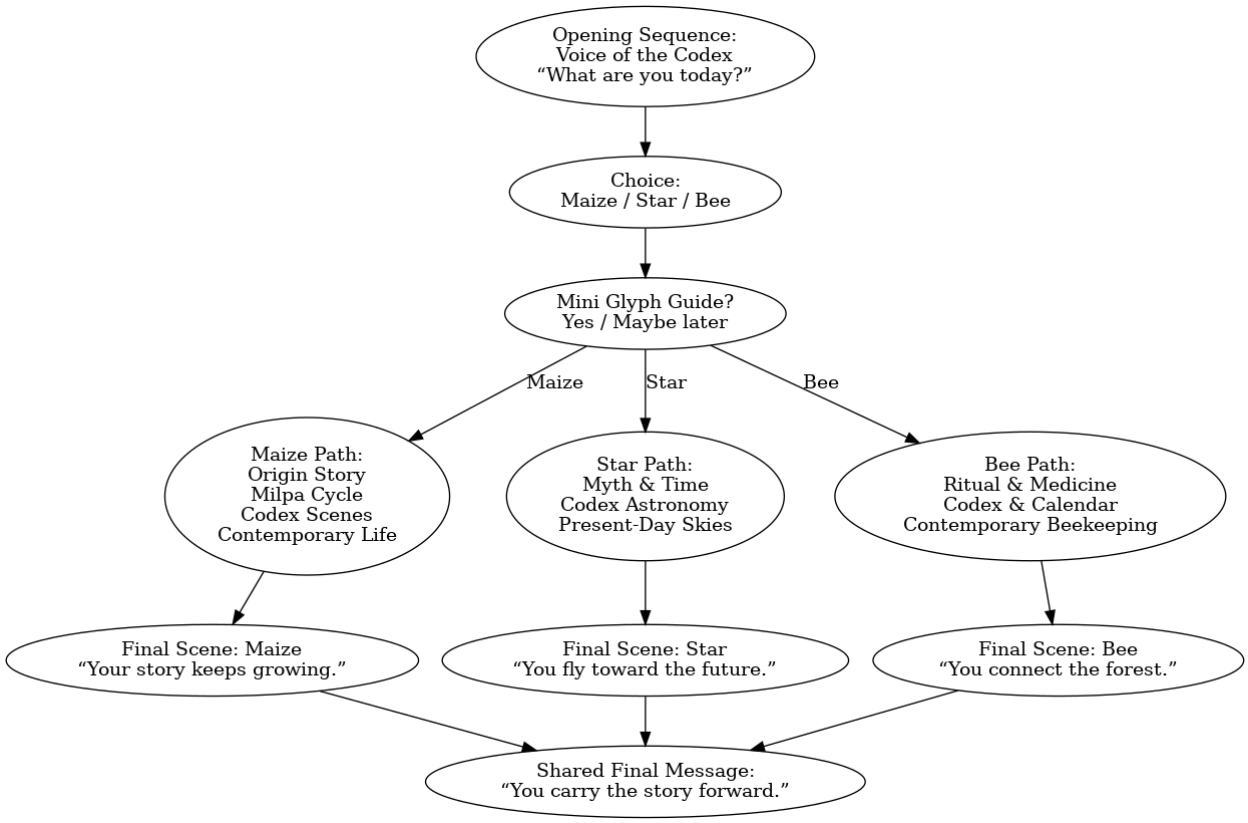

Figure 4.2: Low-Fidelity Narrative Flowchart of the Prototype

The Star path draws from astronomical pages of the codex—such as the Venus Tables—and centers the role of stars in shaping time, ritual, and planting cycles, with reflections on how constellations remain alive in Maya storytelling today.

The Bee path follows *Xunan Kab*, the melipona bee, highlighting traditional beekeeping, ritual uses of honey, and the contemporary efforts to protect melipona culture, particularly through intergenerational care and environmental activism.

All of these paths would probably expand and evolve in different ways depending on the material gathered for the development of the game. Ideally, each path would include interactive moments where players make decisions—not to “win” or test knowledge, but to shape the narrative flow. For example, in the current script, players can choose to learn about glyphs through the Mini Glyph Guide, or go directly into their chosen path. It is expected that gathering the material (e.g stories, videos, photos) to nurture each path would result in more branching moments within the narrative that invite the player to follow different routes according to the elements that spark their interest, listen to elders, or enter moments of pause and reflection.

The paths are designed to interlace symbolically at the end, in a shared final message that affirms the codex as a living presence—“not just a book, but a heart that still beats.”

This structure reflects both cultural coherence and narrative openness: it enables multiple entry points, honors different learning rhythms, and makes room for symbolic return. As the prototype develops, further layers—such as audio recordings, elder voices, and visual glyph interactions—may deepen the affective and relational dimensions outlined in the script.

4.6 Next Steps for the Prototype

The development of this script marks only the beginning of a longer process of prototyping, experimentation, collaboration, and refinement. While the initial design points towards the viability of storytelling-based interaction for engaging with the Maya codices, there are several areas where the project must evolve to better serve its intended audiences and fulfill its goals of cultural activation and community-centered design.

- **Script and Content Development**: The first stage of refinement involves the continued collection, co-creation, and expansion of narrative material. While the initial prototype establishes a narrative structure rooted in the cyclical, relational logic of Maya storytelling, it remains a draft, open to enrichment and reconfiguration through further collaboration. This includes integrating additional mythological episodes, ancestral teachings, and symbolic references drawn from codices, oral histories, and local knowledge. Equally important is the incorporation of modern-day cultural references and lived realities, ensuring that the narrative speaks not only to the past but also to the continuity of Maya life in the present. For example, scenes may reflect contemporary agricultural practices, linguistic revitalization efforts, or social challenges such as migration and climate change—each framed within Maya epistemologies. The goal is to increase the nuance, cultural specificity, and emotional resonance of dialogue, branching choices, and narrative outcomes.
- **Audio, Interaction, and Language Support**: To deepen immersion and honor the oral dimension of Maya storytelling, the next iteration of the prototype should also incorporate audio recordings, including spoken narration in Yucatec Maya and Spanish. Sound design such as background ambiance, ceremonial music, or environmental cues can further animate the digital space and support users' experience. Additional interactive elements (such as puzzles, ritual simulations, or branching dialogue) can be added with care, ensuring they serve the narrative rather than distract from it. Future versions could also include multilingual options to reflect the linguistic richness of the region and accommodate users from both Maya-speaking and broader educational contexts.
- **Testing and Iteration**: The prototype should undergo user testing in educational and community contexts, including classrooms, cultural centers, and workshops led by collaborators. These sessions would prioritize observational feedback, open dis-

cussion, and co-reflection, particularly with children and young people from Maya communities. The aim would be to assess usability and to listen carefully to how participants interpret, feel, and respond to the content. Their insights would inform iterative updates, focusing not only on technical improvement but on cultural and emotional resonance.

- Collaborative Expansion: A core principle of the project is that design must remain open and collective. Accordingly, future phases should involve additional Maya artists, educators, linguists, and elders to expand the range of stories, designs, and languages represented. This would allow the game to grow into a modular and flexible tool—one that can be adapted for different community contexts or educational needs. Ongoing partnerships would also help navigate questions of representation, authority, and continuity, ensuring that Maya voices remain centered in both process and outcome.
- **Distribution and Access**: Finally, distribution and long-term hosting must be considered. Potential platforms could be educational networks, digital museum spaces, or community-curated websites. However, these choices raise important questions of data sovereignty and digital stewardship. Who owns the game? Who decides what updates are made? How are community contributions acknowledged and protected? These questions require dialogue, not technical fixes, ensuring that the game remains accessible, responsive, and accountable to the communities it represents.

This chapter set out to explore how storytelling, co-design, and the playful reactivation of cultural memory might serve as tools to bridge the historical distance between the Maya codices and the contemporary communities to whom they belong. By engaging Maya collaborators as co-designers and storytellers, the game prototyping project foregrounded relationships, prioritizing voices, rhythms, and narrative structures that continue to shape Maya ways of knowing. What emerged was not a finished product, but a shared process grounded in collective imagination and storytelling. This process of collective inquiry, while far from providing a definitive solution, grapples with important questions about the digital lives of cultural artifacts. In their act of rebirth, Hunahpú and Xbalanqué were transfigured. Perhaps, emerging from the ashes is not to be restored to an original state; it is move again, to animate fragments in ways that remain connected to their origins while opening pathways toward the future. In this sense, more than a vessel for digital presence, the prototype proposes a gesture of continuity, transformation, and ”return”.

While the codices remain largely removed from the spaces where Maya knowledge is created and transmitted today, this project offered one possible way to reimagine their presence. This framework moves away from digital return as the restitution of an object, prioritizing instead the creation of spaces where Maya ways of knowing can be activated on their own terms—through story, voice, symbol, and relation. In response to the epistemic violence that has reduced the codices to artifacts within colonial and academic frames,

this project affirms that what must be returned is not only the text, but the epistemology that makes it meaningful. By foregrounding co-design, oral tradition, and playful interaction, the prototype resists translation as erasure and instead works toward a form of digital presence in which knowledge, memory, and cultural continuity—not the object alone—take priority.

Embers

Not everything ends when the flames die down. Sometimes, some of the fire's energy is conserved within the remaining material, causing it to smolder and glow. Embers are formed when a fire is not fully consumed, leaving behind flickering fragments that hold the potential to start a new blaze. This chapter returns to the heat and heart of this thesis, gathering the residual glow of what has been explored, created, and learned. "Embers" symbolizes what still burns: the ideas that continue to flicker with life, the questions that resist closure, and the possibilities that extend beyond the final page.

In the context of this work, embers represent the ongoing tension between preservation and transformation, between loss and resurgence. They are the afterglow of a process that began with the desire to look beyond digitized codices as static artifacts, and instead engage them as living objects—repositories of memory, imagination, and relationship. Through a prototype grounded in co-creation and storytelling, this research sought not just to study heritage, but to participate in its becoming.

As such, this final chapter does not offer a conclusive ending. Instead, it reflects on the key contributions of the thesis, the significance of its interventions, and the methodological paths it opens. What remains, in the warmth of these embers, is a commitment to the unfinished: to what might still emerge when stories are listened to differently, when technologies are used with care, and when cultural memory is treated not as a relic, but as a flame that can be carried forward.

Care, in this context, is not only a matter of usability or efficiency, but of attunement to context, power, and responsibility. It involves designing with—not for—communities, foregrounding their values, voices, and ways of knowing throughout the process. A technology used with care recognizes the histories it enters, the bodies it touches, and the knowledges it represents.

Assessing whether a technology is used with care, then, cannot be done solely through institutional metrics or technical benchmarks. It requires ongoing, situated evaluation grounded in the lived experiences of those most affected. This includes asking: Does the technology support cultural continuity? Does it invite interpretation or impose meaning? Does it remain open to feedback, refusal, or revision? Most importantly, those who hold

cultural and epistemic ties to the knowledge at stake must have a say in how care is defined, enacted, and sustained.

5.1 Findings and Contributions

This thesis set out to answer the question: *How can digital artifacts be meaningfully reconnected with the living communities from which they originate?* The findings suggest that meaningful reconnection requires more than digital access or institutional gestures of return. It demands a shift from viewing artifacts as static objects of heritage to engaging them as relational and pedagogical tools. Through co-design, storytelling, and participatory play, digital artifacts like the Madrid Codex can be recontextualized in ways that invite community interpretation, activate cultural memory, and foster new forms of belonging. Meaningful reconnection, then, is not a technical solution but a relational and epistemic process that centers community voices, supports situated meaning-making, and reactivates the cultural logics from which the artifact emerged.

Throughout this thesis, I have returned again and again to the figure of the codex—not only as a historical object, but as a symbol of epistemic rupture and potential renewal. In doing so, I have joined a broader conversation about virtual repatriation, a practice that has often been framed in terms of digital access or restitution of cultural property. Yet as many critics and community members have noted, access alone does not constitute return. A digitized artifact held in a European or national repository, even if made available online, remains bound to a set of colonial logics: it is framed, named, and classified within systems that often exclude or distort the epistemologies from which it emerged. In this light, virtual repatriation must be understood not simply as a technical or archival project, but as an epistemic and relational one—a process of re-embedding cultural materials within living knowledge systems.

The prototype presented here engages with this challenge not by "returning" the codex as a scanned object, but by reimagining its use through storytelling, co-design, and participatory play. What is being returned, then, is not a thing, but a relationship. It is the capacity to interact with ancestral knowledge in a way that is active, affective, and situated—that is, embedded in local understandings, community voices, and pedagogical rhythms. Rather than presenting the codices as static documents to be decoded, the game invites players—particularly young Maya users—to explore, inhabit, and extend their meanings through choice, imagination, and reflection. It is not a game about the codices; it is a game that thinks like them: relational, cyclical, visual, symbolic, and open-ended.

The participatory development process was central to this shift. Through a series of conversations, workshops, and co-writing sessions, collaborators surfaced shared concerns: the codices feel distant not because of apathy, but because of the way they have been

framed; storytelling must be centered not as a form of translation, but as a mode of knowing; cultural content must be presented in ways that are emotionally resonant, linguistically inclusive, and technologically accessible. These are not minor preferences. They are methodological and ethical principles that challenge extractive forms of heritage work and insist on the value of Indigenous epistemologies.

In co-creating this prototype, the collaborators enacted a form of virtual repatriation that is not about recovering lost origins, but about building future relations. They did so by mapping ancient symbols onto present-day practices, by thinking with the codex rather than merely about it, and by crafting a design process that mirrored the values embedded in Maya storytelling itself—reciprocity, collectivity, symbolic play, and respect for knowledge as lived experience.

This reveals something important: the codices can still teach, but only if we listen in the right register. Not as outsiders deciphering a code, but as co-inhabitants of a world in which stories, symbols, and rituals are alive and evolving. Through this prototype, what is returned is not simply the codex, but the right to make meaning from it—to speak with it, not just about it.

In this sense, virtual repatriation is not the end point of this project, but its point of departure. The prototype offers a model for how digital tools can support cultural revitalization that is not nostalgic, but forward-facing—one in which ancestral memory is not fixed in the past, but carried forward in new forms. It is, quite literally, a way of tying bones with string and setting them back into the current—not to preserve them, but to let them move.

Storytelling here was not treated as a supplement to heritage, but as the method through which heritage becomes legible, lovable, and alive again.

This thesis contributes to techno-anthropology by treating digital artifacts not as inert data but as relational mediators—objects that shape social imaginaries and ethical orientations. It also extends debates in digital heritage and museum studies by proposing a participatory, epistemically situated model of virtual repatriation that centers Indigenous knowledge systems, not merely as content but as co-constructors of meaning.

Methodologically, the project advances a practice of speculative, collaborative design as both a research method and a form of cultural return. By building a game with Maya collaborators, the thesis offers a template for how digital storytelling can serve as a generative epistemology, one rooted in dialogue, care, and future-making rather than extraction or display. This is not research about the codices, but research done with and through them—making design itself a decolonial gesture.

5.2 Reflecting on Significance

This thesis does not offer a universal model, but a situated practice—a way of working that is grounded in context, relationship, and refusal. Its significance lies not in generalization, but in the specificity of its entanglements: a codex held far from the community that once gave it meaning; a set of stories that have survived through memory and voice; a prototype born from collaboration, speculation, and care.

At its heart, this work challenges a central assumption in digital heritage: that visibility is equivalent to justice. What it shows instead is that access without relation, without epistemic grounding or community voice, can reinscribe the very forms of erasure it claims to undo. The digitized codex, when presented as a visual object for external consumption, risks becoming another form of colonial display. It remains legible only to those fluent in the frameworks of Western archival knowledge, and silent to those whose knowledge it once encoded.

By contrast, the approach developed here repositions the codex as a site of ongoing world-making. It affirms that heritage is not what is kept, but what is carried, and that carrying requires relationship. This shift from preservation to activation is essential in thinking about cultural continuity in digital contexts. It is a move from seeing heritage as something that must be explained, to understanding it as something that must be felt, practiced, and reimagined. In doing so, this thesis contributes to broader conversations about how digital tools can be used not to extract or display culture, but to nurture it.

Importantly, the project resists the fantasy of technological neutrality. It argues that digital heritage work is situated, that platforms and interfaces are structured by assumptions about who knowledge is for, how it should be represented, and what counts as legitimate interpretation. Thus, by foregrounding community-led design and storytelling, this research insists that digital media can become spaces of epistemic return, but only when they are shaped by those to whom the knowledge belongs.

What is significant, then, is not the prototype alone, but the process it models: one of listening, co-creating, and learning to be in relation. It does not seek to resolve the tensions of virtual repatriation, but to stay with them—to ask how we might live with fragments, how we might make space for resurgence, and how we might design technologies that remember differently.

5.3 Future Directions

If this thesis has shown anything, it is that return is not a destination but a practice. The prototype developed here is not an end point, but a beginning: a model that invites further experimentation, deeper collaboration, and wider application. There is rich potential to extend the prototype in ways that deepen its cultural, linguistic, and pedagogical resonance. Future iterations could incorporate:

- **Audio narration in Yucatec Maya** allowing users to hear the rhythms and sonorities of the language alongside the visual and interactive elements. This would honor oral tradition as a mode of transmission and further situate the game within local epistemologies.
- **Multiple narrative paths** such as stories focusing on weaving, celestial cycles, or community ritual, co-developed with additional cultural experts and artists. These paths could build on existing threads or introduce new elements of Maya cosmology and daily life.
- **Animation or interactive glyph guides** offering dynamic ways to learn how to engage with the codex's visual grammar without flattening its meanings into didactic lessons.
- **Mobile access** ensuring that the game can be played on a range of devices, particularly those available in rural and school-based settings. Accessibility, both technological and linguistic, must remain central to the design process.

While these proposed features suggest a range of exciting directions, it is important to underscore that the prototype, at this stage, remains exploratory and unfinished. It offers a framework—an invitation, rather than a final product. To fulfill its potential as a meaningful intervention in digital cultural heritage, it would need to be finalized, tested, and iterated. This includes conducting usability studies, gathering feedback from intended users (particularly Maya youth and educators), and refining the design based on their insights. To assert the success of the suggested method requires longitudinal studies on user impact and cultural perception.

Evaluation should extend beyond technical performance to include questions of affective engagement, cultural relevance, and epistemic impact. Does the game foster connection to ancestral knowledge? Does it make the codices feel more alive, more usable, more ours? Only through sustained cycles of testing and reflection can the prototype move from symbolic gesture to grounded practice.

A critical step towards this involves formalizing and expanding collaborative networks. This could include:

- Educational partnerships with Maya-language teachers, rural schools, and cultural

organizations to adapt the game for classroom use. This would involve developing complementary lesson plans or facilitation guides co-authored with educators.

- Long-term co-design labs, where future versions of the game are developed through iterative, in-person or hybrid workshops with youth, elders, and cultural workers. These labs could become models for participatory digital heritage in other contexts.

Broadening the impact of this work could involve developing ethical guidelines and policy recommendations for museums, archives, and digital heritage platforms, advocating for community-led digitization, reciprocal access, and culturally grounded metadata practices; or creating toolkits and open-source frameworks for others to build their own heritage games, rooted in relational ethics and situated storytelling.

Beyond the prototype, this project suggests broader applications for digital tools in cultural heritage, offering a transferable approach for engaging with other displaced artifacts and Indigenous knowledge systems. The process developed here—grounded in co-design, relational ethics, and culturally situated storytelling—can serve as a methodological template for similar efforts in different contexts. At the core of this thesis are methods such as participatory design with community collaborators, storytelling rooted in local epistemologies, and affective engagement through interactive media.

These methods are not universally applicable templates, but adaptable practices that must be reshaped in dialogue with the specific histories, languages, and values of each community. Cultural specificity, linguistic diversity, and political context all shape what constitutes meaningful engagement. Any attempt to apply this framework elsewhere must begin not with design, but with listening.

5.4 What Still Burns

Not all knowledge can, or should, be resolved. In the wake of this research, certain questions, tensions, and possibilities continue to burn quietly at the edges of the work, illuminating what remains unfinished, what resists closure, and what may yet ignite new paths forward.

First among these is the question of what it truly means to return knowledge. Virtual repatriation, as this thesis has argued, must go beyond technical access or aesthetic restoration. Yet the deeper work of relational return—of re-situating knowledge in its epistemic home—remains fragile, ongoing, and contingent. The prototype represents one small gesture toward this return, but it also reveals how easily heritage can be abstracted, commodified, or disconnected if care is not sustained. The codices do not return simply because they are seen; they return when they are spoken with, interpreted, lived.

Among the most persistent questions is how digital tools might support—not replace—embodied and intergenerational knowledge transmission. Can a game, a screen, a digital story truly

hold the weight of ceremonial knowledge, or the depth of learning that comes through land, gesture, and kinship? This thesis proposes that digital media can create space for engagement, wonder, and reflection. But they are not substitutes for being in relation. At best, they are companions—ways of keeping stories warm so they can continue to be shared and explored in other forms.

Closely tied to this is the question of ethical responsibility: What role do researchers, designers, and institutions play in shaping the digital futures of cultural heritage? Who gets to decide what is remembered, what is shown, and what is left unsaid? How do we remain accountable—not only to our collaborators, but to the ancestors, the land, and the future generations who will inherit these digital traces? These are not simply theoretical concerns. They are ongoing responsibilities. As digital heritage work continues to expand, it must remain rooted in humility, in listening, and in practices of refusal as much as inclusion. The temptation to scale, to polish, to extract meaning must be held in tension with the needs of the communities involved and with the knowledge that not all meanings should be made public and not all stories should be "returned" through screens.

The digital invites disclosure, sharing, and circulation, but not all knowledge wants to be rendered legible in this way. Some stories carry silence as part of their power. Some meanings are not meant to be public. This project, in its speculative and participatory dimensions, has tried to remain attuned to these boundaries, but the challenge remains: how can co-design make space for opacity, partiality, and closed practices?

There is also the question of how to listen differently—not to confirm what we already know, but to make room for modes of knowing that exceed our frameworks. This includes listening to non-linear timelines, rituals, silences, and oral history. It includes being accountable to forms of meaning-making that do not always yield to interpretation or explanation. The codices invite this kind of listening and so too should any methodology that seeks to engage them.

Finally, what continues to burn is the sense that this work is part of something much larger. The embers carried here were not sparked by this project alone, and they will not extinguish when it ends. They are part of a collective fire—one that burns in classrooms and ceremonies, in memory and imagination, in languages reclaimed and stories retold. It belongs to a movement of Indigenous activism and digital justice.

To tend embers is to accept that the fire is not over. It is to hold space for what is unfinished, for what flickers and waits. This thesis does not conclude with certainty, but with an opening: an invitation to keep listening, keep learning, and keep designing in ways that honor the living knowledge that still glows beneath the surface.

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Appendix 1 - Prototype Script

Script Idea: Three Paths

Before you were here, there was the codex
It began in the hands of the artisans:
hands that ground color, and painted stories.

(next)

The priests read it by torchlight.
They spoke to it. It responded with letters, images, and tales.

(next)

Then... silence.
The codex crossed the sea.
It swayed in the belly of a ship.
People around it whispered words it could not understand.

(next)

Time passed.
The codex stayed in place.
Gathering dust.
Keeping stories no one was there to hear.

(next)

(Moment of choice) But then... it was found.
You hear the soft crackle of pages unfolding...
A voice from within asks:

> **"What are you today?"**
> (1) I am maize
> (2) I am a star
> (3) I am a bee

(next)

You see a glyph shaped like (1 - 2 - 3)
It means:

- (1) **"nal"**: maize
- (2) **"ek"**: star
- (3) **"kaab"**: bee

In Mayan writing, images can contain sound, meaning, and magic. Do you want to learn to identify more glyphs?

- **Yes! Teach me** → (Mini Glyph Guide)
- **Maybe later** → (Continue story 1, 2, or 3)

Mini Glyph Guide

What are glyphs? Mayan glyphs are images,
but also words and sounds!

Some represent things, like maize or bees
Some represent sounds, like (example), (example).
Together, they tell stories!
(next)

How are glyphs made? Glyphs are made of small parts:

- **A main sign** – the meaning
- **Small helpers** – show sound or extra information

They are read in pairs,
top to bottom and left to right, like a grid.

Try to find them in the codex!

(next)

(Image of the codex here)

Can you find the maize glyph here?
(small explanation)

(next)

Want to know more? Every page of the codex contains more glyphs waiting to be read. Some represent rain, others gods, animals, time, and people.

You don't need to know them all;
just remember they also have a voice.

Story 1: Maize

You are **"Nal"**, sacred maize.
You were planted with care.
You are not just food: you are history, spirit, and life.

(next)

You grow in a *milpa*, a living garden where maize, beans, and squash help each other.
Farmers follow the stars to plant you.
Rain is asked of the gods.
Each season brings new care and new celebrations.
You are more than a plant.
You are part of the calendar.

(next)

How does it work?
(explain the milpa cycle)
(next)

You see yourself in the pages of the codex.
A god plants you.
A priest offers you.
You rise between worlds: roots in the earth, leaves in the wind.
Your glyph is painted again and again.

(next)

Today, families still plant you in *milpas*.
They eat you in *tamales*, in *atole*, in *tortillas*.
tamales, atole and toritillas can be clickable and lead to their own images/recipees/stories
Your roots remember everything.

(next)

You are **Nal**, and your story keeps growing.
You are not only in the past. You are part of what is alive today.
a - final message
b - return to choice

Story 2: Star

You are a star, a spark in the night.
Humans watched you sail cross the sky.
They gave you a name. A place. A purpose.
You are not just light.

(next)

Your stories are read in the sky like a giant book.
Stars told when to plant, when to harvest, when to pray.
Astronomers observed with eyes and hearts—no telescope needed.

(next)

The sky is also folded into the pages of the codex.
(Explain Venus Tables?)
You are there, shining in stories from the past.

(next)

Your light still touches the Earth, centuries later.
(Include legend and then modern images or video)

(next)

You are a star.
A memory of history and a promise of the future.
Even if no one writes your glyph, you keep shining.
You light up the story and sail into the future.
a - final message
b - return to choice

Story 3: Bee

You are **Xunan Kab**, the melipona bee.
You do not sting.
You live in hollow logs, in quiet places, where the air smells sweet.
Your honey is medicine.
Your hive is sacred.
You are part of the community.
You are small, but powerful.

(next)

Since ancient times, people have built you special homes:
log hives called *jobon*.
They ask for your honey with songs and smoke.
Your honey was used in healing, rituals, and as offerings to the gods.
You are part of the balance between people and forest.

(next)

In the codex, glyphs speak your name.
You are there in rituals and calendars.
You are not just an insect:
you are a bridge between people and spirit.

(next)

Today, beekeepers still care for melipona bees.
They learn from their grandparents.
They protect you from machines, smoke, and poison.
Your honey is still special. Still medicine.
People still sing to you.
Some try to bring you back—
to the forest, to the people, to the stories.

(Include videos/images of modern bee keepers)

(next)

You are a bee.
You connect flowers, forests, families, and gods.
a - final message

b - return to choice

Final Message

You were maize, growing with the sun.
You were a star, shining in the sky.
You were a bee, sweetening life.

Each path took you through time: past, codex, present.

Now you know:
The codex is not just a book.
It is a heart that still beats.
Its stories live in the fields, in the skies, in the forests—and in you.

When you listen to your grandparents,
when you watch the stars,
when you plant a seed or care for the land,
you help the story continue.

Thank you for walking the path.
Thank you for remembering.

The story is not over.
It lives with you.

Back to the beginning
Exit