

# Winds of Change: Seeking, Preserving, and Retelling Indigenous Knowledge Through Self-Organized Online Communities

Lindah Kotut  
Information School  
University of Washington  
Seattle, Washington, USA  
kotut@uw.edu

D. Scott McCrickard  
Department of Computer Science  
Virginia Tech  
Blacksburg, Virginia, USA  
mccricks@cs.vt.edu

## ABSTRACT

Technology has provided an environment for connecting indigenous community members and provide a means for them to seek and engage with their indigenous knowledge (IK). Emerging research has examined the effects of social media on specific IK, including the possibility of undermining community agency. In this work, we contrast how indigenous community members engage with IK offline, and in their own self-organized communities online. Through interviews with community members and a study of Facebook Pages and Facebook Groups, we seek to better understand these practices and elicit design recommendations. Our findings describe how community roles have shifted in the presence of technology, notably with absence of elders and the inclusion of “born towns”-community members who live in non-traditional settings. We also find that fluency in the indigenous language served both as a gatekeeper: guarding the community knowledge, while also facilitating discussion surrounding different aspects of IK.

## KEYWORDS

Indigenous Knowledge, Intangible Cultural Heritage, Online Communities, Post-Colonial Computing, Critical Computing, HCI4D

### ACM Reference Format:

Lindah Kotut and D. Scott McCrickard. 2022. Winds of Change: Seeking, Preserving, and Retelling Indigenous Knowledge Through Self-Organized Online Communities. In *CHI Conference on Human Factors in Computing Systems (CHI '22)*, April 29-May 5, 2022, New Orleans, LA, USA. ACM, New York, NY, USA, 15 pages. <https://doi.org/10.1145/3491102.3502094>

## 1 INTRODUCTION

Interdisciplinary research has explored and highlighted the challenges of preserving knowledge held by communities that follow an oral tradition—and not leaving a written record. Research that focus on these means of communication are encapsulated under Indigenous Knowledge (IK): how oral narratives are “respected and refined” [3], which is itself, a subset of Intangible cultural Heritage (ICH) research that studies “immaterial manifestations of culture,

represent[ing] the variety of living heritage of humanity” [26]. Research in this domain has, and is, still in the process of considering the use of technology to describe and design technology meant to aid amplification, engagement, and preservation of critical oral histories. These solutions are non-trivial, as they involve practices that are disappearing with time [22, 58], contends with the question of appropriateness of technology in the space [56], and when appropriate, how to introduce technology in a manner that respects the agency of the story holders [21, 23]. In this paper, we present the challenges that indigenous community members specifically face as they seek to interact and preserve their IK. This includes the challenge introduced by geographical distance, language fluency, and the presence or lack of participation by key members of the community.

The intersection of technology and indigenous community has provided opportunities, even as it introduces new challenges. This has included the challenge of reconciling differing values [68], and in addressing the typical lack of “authoritarian narrative” that is the nature of IK [6, 7, 69]. The possible harm inflicted to an indigenous community by placing inflexible boundaries around what constitutes “culture” [41], and/or focusing on the most visible aspect of culture [41] is also important to consider. Postcolonial computing [11, 16] has provided some guidelines on how to navigate this concern: emphasizing to designers, the importance for the community members to retain agency and ownership of the narrative—especially when dealing with power imbalances [39]. IK is also constantly evolving, as community members re-interpret what it means to them given the time, their context, and their need, making it challenging to design technologies to interact with the IK—since preserving it limits its evolution. There seems to be scant research concerning how the holders of IK—the indigenous communities, consider these challenges: balancing the evolutionary nature of their IK, while maintaining their agency over their stories when using technology that support, engage, amplify, and preserve IK.

We scaffold our research in the existing work to further probe the place of technology, especially social media, as leveraged by members of the indigenous communities. We seek to deepen the discussion on the intersection of technology and underrepresented communities and to offer design recommendations that would support the community members intention with their IK: the preservation and/or the evolution. We do so by investigating how an indigenous community leverages technology to record, engage with, preserve, and discuss indigenous knowledge—and the repercussions of this, considering the online vs offline communities, and the local vs diaspora needs.

---

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [permissions@acm.org](mailto:permissions@acm.org).

*CHI '22, April 29-May 5, 2022, New Orleans, LA, USA*

© 2022 Association for Computing Machinery.

ACM ISBN 978-1-4503-9157-3/22/04...\$15.00

<https://doi.org/10.1145/3491102.3502094>

We conducted a two-phase study. First, an interview-based study with 13 indigenous members of the Kalenjin community from the Rift Valley region of Kenya. Five of the participants are elders and considered “knowledge bearers” [8, 26] by their respective communities. We found that offline community members often sought IK counsel from these elders regarding contextual knowledge to be applied in their day-to-day lives. The community members also sought the narration of their community history—a credit to the elders’ art of compelling storytelling. The second part of the study involved exploring organic interactions on Kalenjin-focused community-organized Facebook Pages (n=10) and a Facebook Group (n=1) from November 2018 to June 2020.

There was a marked absence of elders in the online discourse—due to their lack of formal language skills and lack of infrastructure [72]. We also noted the significant participation of community members who were born and/or raised geographically distant from their ancestral homes. These so-called “*born-towns*” did not have much opportunities to learn and practice IK in their indigenous language. Yet as with other youths (e.g. the “*born-frees*”—those that were born around the time apartheid was abolished in southern Africa) [19], the *born-towns* wish to also engage, and contribute to their culture. The lack of language fluency particularly impacts the kind of IK they consume online, further impeding their grasp of the sacred/secret intricacies of IK that is shared with the online community.

Through this work, we build upon previous efforts addressing the design of technology for indigenous communities, especially in the African context [2, 3, 21], that also contribute to postcolonial computing [16] discourse. We leverage approaches that guide the respectful design of technology [21], especially when there is a perceived power imbalance [7, 39, 69]. We do so by highlighting the needs of community members in their search and engagement with IK both online and offline. Their use of their indigenous dialect in their online discourse provides an avenue to discuss sensitive IK that are not meant to be understood by others outside of the community. In addition, while offline community members have access to elders whom they can ask contextual information, the “*born-towns*” instead leverage organic online communities to seek answers.

We make three contributions with this work. First we expand the Human Computer Interaction for Development (HCI4D) understanding of how indigenous community members engage with Indigenous Knowledge (IK) on social media. Second, we examine the type of IK that is sought and engaged with online, contrasted with that which the community members interact with offline—focusing on observed difference in roles (such as the absence of elders in the online discourse and the increased participation of “*born-towns*” who seek to establish their cultural identity). Finally, we outline design guidelines for researchers and designers, towards the respectful use of technology for engaging, preserving, and amplifying IK, thus guiding the community members in preserving traditions, supporting their evolving culture, while respecting the community ownership and agency over their culture.

## 2 RELATED WORK

Our study is at the intersection of Intangible Cultural Heritage (ICH)—which enfoldes Indigenous Knowledge (IK): “the legacy of physical property and intangible attributes of a group or society that are inherited from past generations, maintained in the present, and bestowed for the benefit of future generations” [36] (citing [47]); and social media use. We examine how members of an indigenous community engage with IK both online and offline: what they seek, what/how they amplify, and/or what they preserve.

### 2.1 Seeking and Preserving Indigenous Knowledge

In this work, we focus on the Kalenjin—the third largest indigenous community in Kenya, with over six million members. The Kalenjin mode of preserving and amplifying their indigenous knowledge (IK) chiefly involve performance and oral narratives. Literature on the Kalenjin are often viewed with suspicion by the community members as the rendering of their oral histories have often been written by British colonialists and are known to be rife with inaccuracies, written in a tone that is condescending to the cultural practices [48], are based on few informants, are stripped of context, and are colored by the prevailing racial theories [35]. The literature often report practices that are considered taboo, or sacred and secret by the community—often omitting critical contextual details [67]. What is fundamentally missing are descriptions and honoring of social structures that uphold, and give meaning and context to the oral histories [42].

How to preserve IK is a non-trivial undertaking. Heritage is typically considered not to have any intrinsic monetary value, thus impeding participation. To incentivize the preservation, value is sought by “instrumentalizing heritage” [27] which is a focus on how situational knowledge [32] adds value to prevailing concerns (e.g. in aiding sustainability), in opposition to preservation for its own sake, or a focus on the IK’s intrinsic value. Who is tasked with the preservation is also important, because taking artifacts and IK from the indigenous community without their permission—for preservation and display in foreign museums [36, 40] is considered an act of cultural looting. Therefore the primary role of safeguarding and preservation of ICH belong to the community members [60].

Technology designed for engagement with ICH have had various measures of success and failures. Researchers for example, have found that community members did not trust translated Wikipedia articles, the community organization instead favoring trusted word of mouth [12]. Lack of access to infrastructure—including smartphones, has also impacted who can participate [72]. Consensus by ICH scholars surrounds the importance of researchers paying attention to what a community chooses to name, revealing the nature of their involvement with the world around them [61]. This observation guide our approach in our examination of what the Kalenjin indigenous community value, based on the interaction with IK on social media. What indigenous knowledge do they seek? What do they wish (not) to preserve? How do they contribute especially to the online community?

IK by its nature is a “living and changeably entity” [26] that is “timeless” [53] and constantly evolving as community members redefine to fit their context. This reshaping of culture still respects

the origins of the IK, while infusing it with their own experiences as they “transform their understanding” [61]. However, lack of access to community repository disrupts this evolution and the process of re-definition. Researchers have considered situations where the passage of IK between generations have broken down, and where technology can serve as a bridge. This includes context such as the “skip generation” [7]—the children who are not raised by their parents either because they are deceased, or have moved to far places for work. Diaspora communities have also had the process of bequeathing IK interrupted, and researchers have designed technology to bridge this gap and facilitate the passage of IK [3, 71]. Building on work that examine renegotiation of communal identity after colonial independence [10, 33], we examine the community relationships with IK both offline and online considering the opportunities and challenges highlighted by these interactions.

## 2.2 Social Media and Indigenous Identity

We also derive insights from work that studied how indigenous community members engage politically on social media [64], and how the Kalenjin specifically sought to re-discover and re-evaluate their (new) self-image: especially after major disruption of community structures, as a result of forced displacements from ancestral lands during the colonial period [25]. This include considering how changing symbols, needs, and technology have impacted how the indigenous community perceives itself. We examine how this also manifest on social media.

Social media has been used to shape members’ identity and culture [46], support family communication with those who live in different areas, including those who live abroad [34]. Online platforms have also been used to showcase conflict [20] and community members taking agency and contributing to their own cultural representation [9]; especially among the youth [50].

There are concerns surrounding the ethical use of social media [18], including its application in sustaining ICH practices [52]. The additional problem of digitizing IK using social media, is that the written word is a barrier to entry for contribution [62], especially among communities that follow oral traditions. Voice social media is an approach that bridges this gap [63], although current approaches are focused mostly in the Asian continent.

With the largest mobile service provider in Kenya offering free and subsidized access to “Facebook-Lite”<sup>1</sup> [43], there is an in-tandem increase in community participation on Facebook. We build on work that studied how communities leverage social media to meet local environmental needs [4, 65, 66], and the impact it has on indigenous cultures [39], by studying how community members leverage Facebook to express their culture, and how the challenges inherent in digitizing oral traditions are met online.

## 2.3 Technology Role in Indigenous Knowledge Preservation

We also leverage lessons learned from how Kenyans use of technology that have been internationally adopted and have influenced other domains. For example, the mobile money exchange *M-Pesa* changed the nature of currency transfer [30]. Additionally, *Ushahidi*

platform has been used to crowd-source news and information especially during critical events [49].

In the context of IK, researchers have studied how one Kenyan indigenous community—the Mbeere, leverage social media in order to amplify IK surrounding sustainability [66]. Others have examined social norms and taboos [57], gendered participation—and especially the peripheral participation of community members who are women [17]. Community assumptions have been of note: researchers have examined the tendency of community members to ignore what they consider as common knowledge in the preservation of IK [54]. We take these observations into account, while also accounting for knowledge that the community typically do not share in these spaces due to negative connotations attached to them that would reflect poorly on the community.

Scholars on ICH have also considered the possible harms of technology designed that were/are not meant to be applied to cross-cultural situations [42], together with respecting community boundaries surrounding sacred rites—especially in cases where community members do not wish to have their IK preserved by any technological means [10]. To address this concern, HCI researchers have prescribed guidelines to establish respectful boundaries for engaging with IK using technology [21]. Further, when considering the use of technology to preserve, engage and amplify IK, we adopt postcolonial computing lens [11, 16] which alongside decolonial computing [1], guide the respectful approach to IK. The United Nations Educational, Scientific and Cultural Organization (UNESCO) also provide guidelines for understanding and interacting with IK [58, 59]. Using these critical lenses, we then consider the impact of technology in impacting cultural identity and elicit design recommendations.

## 3 STUDY METHODOLOGY

We conducted a two-phased study: First, an interview-based study with 13 members of the Kalenjin community spanning indigenous knowledge experts: elders with encyclopedic know-how of community oral histories (we also call them knowledge-bearers and counsels interchangeably in this paper)<sup>2</sup>, professionals who worked with cultural museums to preserve and showcase tangible artifacts from the community, and other community members spanning different age groups who engage with IK both online and offline, as available. Second, we observed organic interactions on 11 Facebook Pages and Facebook Groups (henceforth referred as Page(s) and Group(s)) that are geared towards discourse surrounding the Kalenjin culture. The study approach was aimed at (1) understanding community perspectives on how community members seek, engage with, and preserve their indigenous knowledge, (2) the place of technology for IK preservation, and (3) how we, as researchers, can serve and collaborate with the community in the spirit of giving back.

<sup>1</sup><https://www.safaricom.co.ke/faqs/faq/520>

<sup>2</sup>Within their respective communities, the elders we interviewed are the go-to people for questions regarding histories and for wisdom. They sometimes serve as members of the council of elders who advice the chief (See “The Chiefs’ Act” as provisioned under the Kenyan Law: <http://extwprlegs1.fao.org/docs/pdf/ken102000.pdf>) in matters of local affairs and adjudicating disputes within their jurisdictions.

| Pseudonym | Age | Gender | Occupation           | Interaction with IK | Follows Facebook Source?   |
|-----------|-----|--------|----------------------|---------------------|----------------------------|
| Kipnai    | 47  | M      | University Professor | Seeking/Preserving  | At least 2                 |
| Berur     | 27  | M      | Entrepreneur         | Seeking             | Lurks                      |
| Towett    | 22  | M      | College Student      | Seeking             | Lurks                      |
| Barno     | 21  | M      | Entrepreneur         | Seeking             | Lurks                      |
| Sugut     | 24  | M      | Entrepreneur         | Seeking             | N/A (Preferred not to say) |
| Teben     | 40  | W      | Greengrocer          | Seeking/Preserving  | No online presence         |
| Leelgo    | 35  | M      | Graduate Student     | Seeking             | At least 1                 |
| Bartai    | 63  | M      | Retired Teacher      | Preserving          | At least 3                 |
| Sogome    | 33  | W      | Museum Docent        | Preserving          | No                         |
| Makigat   | 87  | M      | Maize Farmer         | Counsel             | No online presence         |
| Batiem    | 88  | W      | Farmer               | Counsel             | No online presence         |
| Konyit    | 94  | W      | Farmer               | Counsel             | No online presence         |
| Tabutany  | 59  | W      | Retired Office Clerk | Seeking/Preserving  | No                         |

**Table 1: We interviewed 13 participants in this study to understand their dominant interaction with Indigenous Knowledge. Of note, the participants who identified their IK interaction as seeking/preserving, 554 did so based on the questions their own (grand)children asked of them. Median interview time was 90 minutes.**

### 3.1 Study Sites and Participants

We conducted an interview-based study with 13 community members (5 W) in the first phase of the study. The participants ranged in ages between 21 and 94 years. Eight participants reported being active on Facebook, six of them engaging with Pages and Groups geared towards discussion on community and culture. Four participants did not have any online presence. We provide a concise summary of the participants in Table 1.

Our participant recruitment varied depending on the status of the community members. For the elders, the first author who is a member of the Kalenjin community sought introductions from older community members known to them. These liaisons acted as references to the knowledge bearers/counselors that we sought<sup>3</sup> to interview. The remaining interviews were done through convenience sampling. All but one interview was conducted in person, at different sites across the country, depending on participant availability and comfort. We conducted some interviews at respective participants' homes (*Teben*, *Bartai*, *Makigat*, *Batiem*, *Konyit*), at their workplaces (*Berur*, *Sogome*), in preferred informal settings such as shopping centers and cafes (*Towett*, *Barno*, *Sugut*, *Leelgo*, *Tabutany*), and through video conferencing (*Kipnai*). Except for *Kipnai* and *Leelgo* who teach and study abroad respectively, the remaining participants live and work in Kenya. The interview duration ranged from 20 minutes to four hours (median 90 minutes) and was conducted in a language preferred by the participants: Kalenjin was preferred by the oldest participants (Counselors—see Table 1 and Figure 1), with a mix of languages: Kalenjin, Kiswahili and English preferred by the remaining participants.

Given the nature of how oral history is remembered and narrated, the presentation of timeline of events is different depending on context. For example, when discussing events that occurred before Kenya won its independence from the British in 1963, the participants would use *age-sets* to position their IK. There are typically seven or eight *age-sets* (depending on the Kalenjin sub-group)

that cyclically change roughly every 15 years. An *age-set* is conferred on male members<sup>4</sup> on the community when they undergo their rites of passage to be considered adults. Beyond their use to mark time, there are other basic rules implied and enforced by virtue of membership in an *age set*, for example: a son cannot be in the same *age-set* as his father, a person cannot marry the daughter of a fellow *age-set* member, and it is not a blessing to live long enough to “see” the *age-set* cycle restarting (the *age-sets* cycle completes roughly every 100 years). Importantly, it allowed the older community members to place themselves within the community, and then would order events using their cultural scheme [14] and narrate their IK naturally. This is because IK is typically passed from grandparent to grandchild over their lifetimes and so the IK has been naturally kept using the cyclical *age-set* structure.

Four participants (*Berur*, *Towett*, *Bartai*, *Makigat*) referred to the *age-sets* to narrate their IK. To give further context, *Makigat*—the oldest male participant belonged to the *Sawe* *age-set* that came of age between 1945 and 1960. Unlike the preceding *age-set Chumo* whose members were conscripted to fight in World War II for the British, the members of the *Sawe* *age-set* had not yet come of age and were forbidden by community practice from even volunteering to fight in the war. *Makigat*'s father belonged to the *Maina* *age-set* that preceded *Chumo* (members of this set were too young to fight in World War I and were no longer warriors to fight in World War II). *Makigat*'s grandfather belonged to the *Kimnyigei* *age-set* that we estimate that they came of age between 1885 to 1900, and so lived in a time before the British colonized Kenya. Given the cyclical *age-sets*, both *Berur* and *Towett* belong to the new *Kimnyigei* *age-set*. *Bartai* belongs in the *Kipkoimet* *age-set* that came of age roughly between 1975 and 1990.

### 3.2 Community Online

In the second phase of our study, we observed organic interactions in self-organized Pages and Groups on Facebook. Facebook provides these spaces for people with similar interests to congregate and

<sup>3</sup>We sought these particular counselors because of their known ability of (re)telling community stories and the stature they had within their respective communities.

<sup>4</sup>Women also had separate but linked *age-sets*, that has since disappeared. As it stands, women are considered adults roughly at the same time as their male peers, although they no longer (legally) undergo their own rites of passage.



**Figure 1: A representative of the Participant interview with known knowledge keepers/counsels. Each was done in person at their homes, and each included community members who were present having heard our interest in the topic. Although these elders are known authority figures in their community, they do not have any online presence—therefore we have obscured their faces to protect their identity online.**

form communities. Pages are typically ran by administrators, and focus predominantly on posts by the administrator with a separate tab allowing a user to see posts shared by others who follow/subscribe to the Page. Groups also have administrators, but their role is more as moderators. User posts in Groups are democratized—showing up on the main feed.

Using the Facebook search feature, we searched for all pages and groups containing the word “Kalenjin” including its dialectal synonyms. This choice is informed by our engagement with discussions surrounding Kalenjin IK, and so other associated keywords including the name of Kalenjin sub-groups, notable elders and/or cultural terms did not return significant results. After obtaining the search results, we asked for administrators’ permissions to observe the community interactions and shared content, and to report our findings. We exempted Facebook Pages were set to private and Facebook Groups that were set to “Closed”; honoring their intention to discuss their subjects in relative privacy. Additionally, while we received approval to observe Group discussions by virtue of the first author’s membership and language fluency, there was hesitancy from some administrators and community members on our intent to share findings outside the community. The discussions within these closed groups gave shape to how we understood how sensitive community stories are told, but given the lack of consensus, we omitted those groups from the analysis stage. This narrowed our selection down to 32 results. We then observed the communities, manually reviewing the topics they engaged with, to ensure that the underlying theme regarded cultural heritage in its various forms. We also excluded Facebook Pages/Groups with less than 500 members (this number is based on the typical observed interaction volume), and those that had only been active for about a year (as they typically are formed in reaction to a significant event e.g. the death of a renown figure in the community). The final short-list included 10 Facebook Pages and one Facebook Group. We provide the summary in Table 2.

### 3.3 Ethical and Sensitivity Considerations in the Analysis

The interview and the analysis phases necessitated extra steps beyond those that are typical to receive approval by the Institutional Research Board (IRB)—since the community members did not have a frame of reference to trust the process of obtaining the IRB approval. The request to interview the elders was done indirectly through liaisons who are older members of the community known to the authors. This is a mark of respect, and a means of verifying the authors community membership, their intentions regarding the questions they have, and their qualifications to handle the entrusted stories. During the interview phase, beyond providing the standard details (for example, that the interview and the recording process can be stopped at any time), we framed our interview approach by first explaining what the stories will be used for—and the audience that would be privy to the stories. This provided the participants the opportunity to define boundaries of how to handle the stories. Each elder had the opportunity to describe these bounds, and we combined them, then used the most restrictive definitions to inform how we approached the analysis stage. We also reviewed the described boundaries at the end of each interview, to allow for the participants to place additional restrictions or relax others, according to their experience.

We received explicit permission to keep voice recording for all the interviews, but there were caveats on transcribing those interviews. There was a wish to not transcribe portions of the interviews that contained stories that are considered sacred and/or secret: since there is a sacredness to the method of relaying these stories orally. This observation and restrictions are not unlike what has been explained in previous work involving indigenous communities [21]. In respecting those wishes, we leveraged the precedence set by previous work by only transcribing/translating the interviews where appropriate, and additionally, applied the omission rules from these interviews to the Facebook data we collected. The written corpus

| Code | Type  | Members | Active Since | Major Focus/Foci   |
|------|-------|---------|--------------|--|
| FP01 | Page  | 7519    | Aug, 2009    | Dictionary and translation                               |
| FP02 | Page  | 6594    | Feb, 2010    | Promotes a book on the origins of the Kalenjin community |
| FP03 | Page  | 40337   | Jul, 2011    | Varied, emphasis modern culture/advances/news            |
| FG04 | Group | 15330   | Sep, 2011    | Advancing the understanding of Kalenjin culture          |
| FP05 | Page  | 25585   | Aug, 2012    | Sharing Kalenjin Culture and History                     |
| FP06 | Page  | 17169   | Sep, 2012    | History behind plants and animals names, news            |
| FP07 | Page  | 17768   | Dec, 2012    | Kalenjin proverbs and sayings                            |
| FP08 | Page  | 5324    | Jan, 2013    | Kalenjin vocabulary                                      |
| FP09 | Page  | 33544   | May, 2013    | Notable Kalenjin figures                                 |
| FP10 | Page  | 4489    | Nov, 2014    | Culture, news, and politics                              |
| FP11 | Page  | 138971  | Mar, 2015    | Current events and their cultural implications           |

**Table 2: Ordered by date established, these 10 Facebook Pages (Coded as FP) and 1 Facebook Group (Coded as FG) – all public, inform our approach. These selection were curated from a larger list of 32 Facebook Pages and Groups focused on seeking/preserving indigenous knowledge of the Kalenjin people.**

used for the analysis thus included transcribed and translated interviews, Facebook data from posts, comments from administrators, group members, and page visitors. We also described the images and videos included in all the posts.

The first author served as the primary interviewer and transcriber. When translating the Kalenjin portions of the interview, we iteratively checked with community liaisons in follow up phone interviews to ensure that metaphoric aspects of the language translated well into English. The first author’s community membership was useful in establishing connection with the elders and trust in handling of community narratives, which encouraged wide-ranging interviews. Six researchers in the HCI domain were involved in the analysis phase. The researchers are of diverse origins (Africa, Asia, the Caribbean Islands and North America) and gender identities (three women and three men). We leveraged grounded theory [51] framework in our analysis: iteratively comparing individual codes and consensus themes until we achieved theoretical saturation [37].

It is important to note that we interacted with sensitive subjects in this research. Therefore, we preface our findings by noting that we found that the topic of male circumcision and female genital mutilation (FGM) acted as a fulcrum in many discussions surrounding the evolution and continuity of the Kalenjin culture, given that they formed the base where the ceremony surrounding the rite of passage to adulthood revolves. While FGM has been outlawed in Kenya since the 1970s, various indigenous communities—including sub-communities belonging to the larger Kalenjin group, still follow this practice in defiance of the law, and to the detriment of the girls who often are then forced into early marriages<sup>5</sup>. There was consensus on the harmful effect of FGM on the participants we interviewed, as well as the communities we observed, with those in favor of preserving the practice relegated to the fringes. We note this to provide context to the tone we use to discuss this sensitive topic and acknowledge that this observation may be limited by the scope of this work.

## 4 PRESERVING TRADITIONS

From the outset, we sought to establish how the community members we interviewed considered the best practices for preserving

indigenous knowledge, while comparing them with the online community. Five of the participants we interviewed (*Bartai, Makigat, Batiem, Konyit, and Tabutany*) are community members considered to be knowledge bearers. As such, they place a lot of importance on their considered sacred role of entrusting this knowledge to the younger generations.

*“During weddings, the elders will meet and chart the histories of the two families—sometimes even up-to seven generations backwards, before the betrothal is given the blessings. It is also an opportunity for the elders to entrust wisdom and for younger elders to observe the custom.” (Tabutany)*

Similar considerations of what to preserve, occur online. We observed that there is an absence of elders in these online spaces—technology adoption having skewed towards the younger generations, and those with access to infrastructure [72].

Preservation, beyond IK that is universally accepted, include debate on practices that are considered harmful—such as the practice of female genital mutilation (FGM) that while has been an illegal practice since the 1970s, is still practiced in secret. There is general acceptance on the need to abolish FGM. However, the practice was one of the processes of a woman’s rite of passage, that included the elder women in the community congregating and sharing IK with the newly mantled adult women. After FGM was outlawed and the community members educated on the harms, the process of passing IK in these contexts was interrupted, with no consensus replacement. This interruption of IK bequeathing is acknowledged within the online community:

*“After elimination of FGM, women skipped one step of cultural passage, as older women could not disseminate secretive teachings to people who have not taken that oath. So women in weddings only receive advice and not teaching; while on the other hand, the boy child is still anchored in traditions through [their ceremonious rite of passage], with old teachings on how to relate to women that have not gone through similar tradition.” (Online)*

While there is a sense of urgency in the online discussion surrounding the interrupted IK, the offline members did not share

<sup>5</sup><https://nation.africa/kenya/gender/state-reinforces-measures-to-eradicate-fgm-1935516>



this urgency. Opinions ranged, but chiefly, the lack of urgency was due to the fact that offline community members had access to co-located community-wide ceremonies that has always been, and still continue to be, part of their lives.

*“Even during the colonial period, when the new chiefs were being installed, and [the ceremonial headpiece] was placed on their head [...]: it was also an occasion for the community to convene in one place.” (Sogome)*

The narrations of these ceremonies extended to the counsels, who described their own experiences of witnessing ceremonies that would not have had context without the geography.

*“When the white man [British colonialist] said that every village had to volunteer men to fight for them [referring to World War II], the elders performed the ‘beat the stomach’<sup>6</sup> ceremony to guide the community on who will be volunteered, and what to do.” (Makigat)*

There are other occasions that community-wide meetings are held: to hold prayers, or to make decisions of grave concern. All community members regardless of age are active participants instead of passive observers in these meetings:

*“There was a sacred tree that the community will congregate underneath—for example when there was a drought. They would bring offerings of millet, a little maize [...] then the elders would go up to the hill taking with them [other offerings]. When they descend back down, the rain would come.” (Tabutanyi)*

There is also a sense of the younger members not asking the questions of their elders, or the younger members preferring the online space as their first port of call to ask questions about their heritage. While some community members, especially those with young children saw the need—in divining a way to hold the vast cultural knowledge for their children, the elders were not as sympathetic:

*“The Nandi<sup>7</sup> are the ones who are going to lose their histories early, because they do not ask questions. You cannot complain that there are no grains in the granary but you did not plant or harvest [...]. It is important [to know the histories].” (Bartai)*

We find that the truth (and cause of urgency in the online community) lies in the ages of the last of the women who had undergone their rites of passage and had sacred knowledge imparted to them before FGM was abolished. The youngest of these women are in their late 60s/ early 70s, meaning that they mostly inhabit the offline space. While co-located community members have many occasions to interact with, and ask questions in person, the online community does not, and are the first wave to witness the lack of these community members as knowledge bearers, and the impact it has on their own cultural identities.

#### 4.1 Sacred Spaces and Location-Specific Indigenous Knowledge

While the offline participants often named locations where the ceremonies were conducted, and/or were of interest to the story, a

<sup>6</sup>This is a direct translation. There is no English equivalent of the Kalenjin term.

<sup>7</sup>A Kalenjin subgroup

recurring topic from the online community involved the identification and impartation of important locations—showcasing their limited knowledge of these spaces, and their quest to identify and preserve them. This is notable, as typically these important/sacred locations do not have physical markers identifying them as such. The knowledge was sought by those who wished to know and visit them, and those who wished to see them preserved for later generations. The locations included those that were lost to the community due to forced resettlement during the colonial period—their exact location entirely reliant on oral histories (unlike the known locations e.g., prayer hills and places where rites of passage are typically conducted).

*“I propose Sach-Oran. Worship at Sach-Oran involved cursing away conditions that had become unbearable to the community e.g an epidemic!” (Online)*

The discussions extended to *future* sacred locations, for example the resting places of known elders and seers. Typically highlighted, are noted elders who never received proper burials and attendant ceremonies<sup>8</sup>:

*“Kipchomber Koilegen Arap Turugat’s<sup>9</sup> remains are still interred in the midst of strangers. He should be brought home to be honored, bearing in mind that he is the eldest of the Turugat siblings. His resting place will be sacred.” (Online)*

Elders agreed with the importance of preserving known sacred locations, but differed by noting that sacred locations are still in active use, giving examples of when proximal community members have used them.

*“When we name ‘Sach-Oran’, it refers to a specific place for a purpose, and a place with certain geographical factors. People still go to Sach-Oran to perform the ceremonies to this day.” (Konyit)*

The elders shared both the names of the locations and importantly, the names of the ceremonies that are typically performed in these locations. We found two public reports of the use of the sacred locations: At the advent of COVID-19 pandemic in early 2020, we observed discussions and reports surrounding the increased use of such sacred locations. Some of the artifacts shared in the online spaces included videos of the sacred rites being performed at named locations. Typically, this would be considered taboo, and initial discussions surrounding the appropriateness of sharing such videos emerged. However, these concerns were almost universally eased when the elders leading the ceremonies openly shared the process (and the reasons) to those who were recording them. We expect that the lack of spirited opposition is allayed by the fact that the elders considered the ceremonies as a community-wide undertaking, in which case, the rules embraced the invisible online audience in their role as observers.

<sup>8</sup>During the colonial period, some of the elders were assassinated and buried in exile; one famous elder had their skull sent to England: <https://www.theeastafrican.co.ke/tea/magazine/murder-that-shaped-the-future-of-kenya-1292866>

<sup>9</sup>A notable leader and seer of the Kipsigis subgroup. He was buried in exile by the British in 1913. The repatriation of his remains remain an open and painful chapter in the community, who have sought for over a century to give him a proper burial.

## 4.2 Rural vs “Born-Towns” Indigenous Knowledge Seekers

We compared the types of knowledge sought by community members online, in comparison to those asked of five participants who were considered elders in their communities (*Bartai, Makigat, Batiem, Konyit* and *Tabutany*). Topics that were common for both online and offline contexts included IK that community members could use to position themselves in the community through an understanding of the communal structure. This included understanding totems, understanding meaning behind names, and contextualizing their experiences. As an example, the Kalenjin community uses totems to identify clans. This has very important implications: for example, those belonging to the same clan (identified by the totem) are not allowed to intermarry, while some clans are not allowed to intermarry for IK reasons that are mostly lost to time. Online seekers sought to have both contextual understanding of the totems, and a complete representation of all the clans. This is because each sub-tribe has different names for the clans and totems, and this knowledge is held by elders. There is a consensus on having a written record of the totems and the associated clans:

*“Is there a way to come come up with a complete list of so that we can know how many clans we have in total across our different subgroups. Someone told me they are 52, but I’m not sure about that number.” (Online)*

We sought to find the types of questions that community members would ask the participants who were elders. They typically revolved around contextual knowledge, and community history. Contextual knowledge are the unplanned IK that is typically learned and shared as part of day-to-day life.

*“I learned by observations, because grandchildren used to live with grandparents, so it happened organically. My daughter started asking customary questions after she was married, but maybe because it was the first time we lived apart and so I started noticing.” (Tabutany)*

In online spaces, the seekers wanted to find meanings behind names. Typically a newborn would be given their own name that represents the conditions surrounding their birth: location (born inside the house? On the way to hospital? In a foreign land?), time of day, environmental conditions (planting season, harvest seasons, famine year), etc. Men would take their last names from their father, and women would receive a second adult “praise name” that is used to describe their nature and attributes after they had completed their rites of passage. The older generation—women who came of age before 1970s still possess their praise names, and the questions asked by community members seek an understanding of their meanings:

Question: *“What does [praise name] mean? It is my mom’s name and I have no clue.”*

Response: *“It means: ‘a strong woman who can depend on herself even in the absence of her husband’”*

Follow-up: *“Interesting... [I thought] she was named that way because my dad went off to war with the Kings African Rifles [World War II] just after their marriage.” (Online)*

The bequeathing of praise names to women in their adulthood serve to provide a glimpse of their unique circumstances, while also

highlighting how women were treated within their communities—including their right of property ownership through the spoils of war:

*“[Praise name] was given to a courageous woman who followed men going to a cattle raid, and got the share of the spoils.” (Online)*

While the examples showcased above involve users who have general know-how and/or proximity to knowledge bearers, the online space highlighted unique seekers. These seekers tended not to be fluent in the language, lived too far from their ancestral lands (including the diaspora) and were referred to as “Born-Towns”—sometimes shortened to “Born-*tao*”. The “town” was typically used to refer to Nairobi—the capital city, but has since been extended to encompass all community members who were born and raised outside the community and have little to no language fluency of the dialect. They would typically ask for English translations, or deeper meanings of proverbs whose direct translations would be unsatisfactory.

*“If possible, could you explain the deeper meaning in English for the born towns’ benefit? Thank you.” (Online)*

For knowledge sought regarding Kalenjin vocabulary, meanings behind names, and other aspects of history, these questions were typically answered. However, when these questions touched the realm of cultural practices, especially those that involved non-public knowledge, these requests were often met with (in)direct reticence:

*“Unfortunately these days we only teach our children English and Kiswahili, especially people in urban areas. Why don’t you teach your children the dialect? Speaking it does not mean that you are uneducated.” (Online)*  
*When I started this page purely in Kalenjin, our people complained and wanted English translation? You no longer understand your language! (Page Administrator)*

In cases where these requests for non-public meanings were granted, there was typically condemnation against sharing.

*Traditions and culture should be kept secret. You have gone too far beyond the accepted boundaries, it is like walking naked. If you want to share these, talk to your elders, or take him aside and explain these things. (Online)*

The assumption that born-towns would have access to elders is compounded by the fact that there is no way that they could be introduced to elders to have these discussions. There is increased recognition of this barrier, and efforts have been made to ensure that community elders are given access to modern tools to be able to share their knowledge with the community at scale. These have spanned amateur efforts [31], to those that are spearheaded by national TV (e.g. KTN’s “culture quest” [24] geared towards a general audience), and community radio and TV stations as spaces to discuss community-focused IK [15], and as a place to amplify community elders [45]. These efforts still assume language fluency.



### 4.3 Indigenous Knowledge Provenance and Narrative Dominance

The online spaces served as a place for discourse regarding the provenance of IK, especially those shared by community members. For example, a term that has been in the Kalenjin lore across its subgroups for decades: “*Lembus chemobendi kandarass (The Lembus [A Kalenjin Sub-group] who do not do contract work)*”. This term is understood by the larger Kalenjin community to refer to the Lembus sub-group as lazy ones who do not wish to work. The online spaces provided a means for those belonging to the Lembus sub-group to narrate their own knowledge regarding the term. According to their oral history [15], the term originated from their refusal to work for the British colonial farmers who’d taken over their grazing lands—a term of resistance and pride that was misinterpreted—assumed to mean laziness.

While there was space to correct and give context to known axioms, the online space was also subject to misinformation. This was most evident when discussing pictures that were shared by community members as they asked questions relating to different aspects that were captured. For example, a response to an a posting of an old picture capturing a group of people drinking indigenous beer that a community member argued did not belong to the Kalenjin:

*“These are not Kalenjins! For the Kalenjins, we place the pot on a higher platform [...] Men then sit round the house on cowhides. The head of the men should be lower than the top of the pot. So that when a [Beer straw] with a filter is inserted into the pot, there was no backwash.” (Online)*

When claims were made either by community members (in Groups) or by administrators (of Pages) that were inconsistent with community knowledge, there were typically calls for the poster to prove their knowledge (from books, or from their oral histories). For example, in a response disagreeing about a clan totem being assigned to a specific clan, a member posted:

*“... my grandmother said it was a lion, I saw somewhere it was an ostrich, here it is a zebra. What is the truth? Where did you get that research”? I have never seen this before.” (Online)*

Narrative corrections also involved “straightening” practices that are considered against custom. Especially those that would be conducted in public. For example, when a notable elder (who was both a political and cultural leader) died, there was a lack of consensus on how the burial should be conducted.

*“I am against the announcement that the mourners will be fed soda and bread during [the elder]’s burial. This is an abomination in our culture and not befitting an elder. Roasted goat meat should be involved, the artifacts that was given to him—to mark his elder status, must be kept in his room to await a special anointing. They [the organizers] should sit down and listen to the elders. This is not how things should be done.” (Online)*

There was a general acceptance of multiple versions of IK. In online communities, this was typically attributed to variations owing to the different subgroups. Members would similarly share both their IK, and what they supposed was different from other

subgroups. This was not so clear with the offline communities. To trigger the comparison, we asked all the participants we interviewed to narrate to the best of their knowledge: why the Tugen subgroup of the Kalenjin retired one age-set out of rotation (the rest of the Kalenjin subgroups have eight age-sets, as described in the Methodology section).

*“You know, I had that question when I found out that they were missing one. I looked it up online, and the consensus seems to be because they went to war against the Maasai and suffered heavy losses so that the age-set was skipped in subsequent generations.” (Leelgo)*

When we shared this version with other participants, there was universal disagreement:

*“Fake news. The Tugen and Maasai were not combatants. They are too far apart geographically. The Maasai fought the Nandi and the Kipsigis. The Tugen would most likely fight with the Keiyo, Marakwet and Pokot, as they are closer geographically.” (Bartai)*

The version most narrated involved war, but of close combatants:

*“... as far as I know, they were wiped out by the Keiyo when they went to war against each other.” (Barno)*

Some agreed on the combatants but not the method:

*“There was no war. They were ambushed. Because of this, there was so much mourning that the elders decided to retire the age-set because it was now considered cursed.” (Sugut)*

An elder in their explanation, gave more context to the reason why multiple versions exist:

*“My elders did not articulate exactly why the age set was removed. There were rumors, of course. I remember my grandmother cursing that generation. I suspect the truth is somewhere in-between... that they were banished and not necessarily killed.” (Batiem)*

The various versions of the same story served to highlight the general acceptance of their existence (with accepted caveats)—most likely due to the unreliability of oral stories as they are carried over distance and time, and the lack of authoritative narrative of the event, which is interesting in and of itself. The existence of multiple versions also provided a possible glimpse of how sacred/secret stories have been retained over years: the Kalenjin, as many other communities who follow oral traditions, also preserve their stories through song (most of *Batiem*’s retelling of World War II experience involved her singing the songs that were composed by her community members from that period). There are no such songs to commemorate the momentous event of the age-group being retired. This lack can be attributed to the fact that reason was sacred and/or secret to the present community at that time, with specific wish for the story to not be preserved.

## 5 CULTURAL BOUNDARIES: SACRED AND SECRET INDIGENOUS KNOWLEDGE

The participants concern with the preservation and amplification of IK regarded the treatment of sacred and taboo knowledge. Typically, the elders or chosen community members would be tasked

to determine the location, the time, and to whom to share the sacred knowledge. The democratization of cultural seeking online, disrupts this passage of IK.

*“Some taboos can be articulated online, but the tone in which the messages are conveyed will be lost.” (Kipnai)*

Taboo topics are typically avoided or talked about in metaphors. This also translates to online discussions. There were disagreements on how to handle the sharing of taboo knowledge between those who preferred to identify them, and those who preferred to follow the prevailing cultural approach and not say anything.

*“This is a subject that is only dwelt in whispers. There is no need for a cultural revolution.” (Online)*

Other online community members preferred taboos to be demystified for two major reasons: (1) some taboos hid harmful community practices that should be aired and addressed, and (2) making these knowledge public would provide surrounding context to community members who are not well cognizant of the culture, who would then use them aid their decision-making. Online community members tended to be more frank about the discussion surrounding taboos—even though their online profiles are not private.

The five participants who are elders treated sacred knowledge sensitively and more secretly. This knowledge included oath ceremonies—an example of the community’s justice system that is used in addition to, or in replacement of the formal justice system. This is used for example when a community member is accused of stealing. The community solution bypassed the formal courts.

*“There was a group of people who stole cattle from a few of us back in the 90s. We knew who they were, but because they did not confess, we could not do anything. So as a resolution, we agreed that the elders will place a curse.” (Tabutany)*

Online discussion around sensitive topics that are not taboo were typically done in dialects and with heavy use of metaphors. While the community members did not disapprove of this practice, they were very sensitive about the information being translated, as this crossed a forbidden threshold. The example below is from a community member who is berating the Facebook Page administrator for their careless handling of sensitive IK by translating it from the indigenous language:

*“[Admin], you were good in educating our people to learn a lot about our culture. But it has gotten to an extent where you want even the secrets of our forefathers to be brought to the public. This should not be done!” (Online)*

There were exceptions to the sacred/secret rule: in cases where elders were recorded sharing sacred knowledge, community members did not question the revelation of such knowledge, trusting the elders as “masters and bearers” of IK [26].

## 5.1 Between Two Worlds: Clash of Cultures

Given the public nature of Facebook Pages and Groups, and the definite opinions on the sacred/secret knowledge, language fluency served as a means of gatekeeping knowledge. Questions that

forded the invisible sacred-line using either English or Kiswahili—languages that are spoken across cultures, were met with such responses:

*“Try To use Kalenjin. That’s IF you are actually one yourself, and are also addressing the Kalenjins specifically. (Online)”*

The delineation was clear between fluent and non-fluent members, and even between those who possess the knowledge especially when matters of cultures were discussed. This is unlike how discussions happen in offline aspects—elders typically address the non-fluent members in Kiswahili, explaining the intricacies of the culture. The elders discretion, and the born-town right to the information by virtue of belonging to the community serving to ease access.

Gate-keeping terms in the online spaces included the use of the pejorative “women knowledge” to denote a lack of cultural understanding of secretive knowledge: “*You must be a woman not to know how this is done in the culture*”, to admonishing questioners seeking to understand the intricacies of the culture to talk to their guardian,<sup>10</sup> even though most likely the “born-towns” do not have access to these guardians.

Beyond the (non)participation of born-towns in the matters culture, the online space was also used as a place to debate the cultural identity/cultural evolution. This included the culture compatibility with religious beliefs, and some practices place in modern times—as community members expand their horizons of knowledge of other customs.

*“There is no culture that is there to stay forever. It is not meant to be carried by one person. The best way is to take with you what is acceptable in the new era. After all, we borrow culture from all over the world. No community maintains the original cultural practices, and even those who attempt these are perceived as primitive within the community.” (Online)*

We considered the context of missing rites of passage for women together with the compatibility question, and explicitly asked the participants—especially the women counsels their thoughts. Their responses showcased an acceptance that the practice will disappear, which is in stark contrast to the online community discussion:

*“The men have figured out how to maintain the chain with their rites of passage, even these days hospitals and churches are involved. For the women it is difficult. We stopped the discussion at FGM—there are those who refuse to maintain the rites without FGM, and we were not given space to consider alternatives. Oh well, what is meant to be, will be.” (Konyit)*

Another considered that the culture had evolved past the need to preserve these practices. *Tabutany* was among the first generation to miss the traditional rites of passage and did not see the lack. That they were the first generation of community members to receive formal education, formal employment, and the right to inherit property by law are factors influencing their views:

<sup>10</sup>Could also be translated as “cultural sponsor”. Both words are approximated translation for there is no true English equivalent of the Kalenjin term.

*“I think it is too late to reinstate the female rite of passage. Too much time has passed, and the teachings of that time are sometimes not compatible with Christianity and modern notion of femininity.” (Tabutany)*

The third counsel shared *Konyit*'s view, and did not feel the lack.

*“Well, you (addressing the author) are asking the questions, trying to find your space in the culture. I hear of others in Kass FM (radio station) doing the same, and it is fine. It has simply shifted from a group impartation to one-on-one. I will not go to the grave lamenting that I have not passed these knowledge.” (Batiem)*

By virtue of their lack of formal education (*Batiem* could read/write), none of the three elder counsels could countenance participating in online spaces when considering their place in helping to preserve culture in those “alien spaces”. The counsels all understood how traditional mass media was increasingly being used to discuss IK but did not see their place in those spaces. *Batiem* thought it more appropriate for young elders like *Bartai* to take that mantle and determine appropriate boundaries. He saw their roles as counsellors.

Elders are depended upon by the community to establish boundaries on what can be shared/not shared, and what aspects of the culture is no longer salient and should be lost to time. This belief extends to the online spaces—where these elders are not active, leaving the offline-online community at an impasse on how to involve all community members, especially born-towns, at scale.

## 6 DISCUSSION

We sought in this study to understand how the Kalenjini—an indigenous community in Kenya, sought and preserved their Indigenous Knowledge (IK). We especially focused on understanding the role that technology has played in this, through observing interactions in online self-organized groups and how this differed from the offline community. In this section, we first situate our findings within other work in the Intangible Cultural Heritage (ICH) and Human Computer Interaction for Development (HCI4D) domains, towards elucidating the role that technology can aid both the preservation and interaction with culture, and then proffer recommended steps that researchers and designers should consider before creating and repurposing technology to be used to support the preservation of IK—especially in the context of an indigenous community.

Our classification of community members who seek/discuss IK online, can be broadly placed into three groups:

- *Contributors*: who intend to engage with like-minded people interested in cultural aspects of the Kalenjini, and to contribute knowledge;
- *Knowledge seekers*: who look for principles to contextualize their lived experience, and add to their understanding of their cultural heritage; and
- *Community seekers*: who search for ways to connect with the community and find their place within it. This encompasses the born-towns.

### 6.1 Negotiation of Cultural Identity

When considering the types of IK that community members seek and engage with online, our research build on existing work that examine how community members navigate “their sense of being Kalenjini” [28] and the signals they use to signify their identity [5]. The three broad groups we outlined above can be re-classified thus: The *contributors* encompassing members who are secure in their cultural identities—manifesting in their choice and confidence to share and contextualize IK online. This include administrators who create the Facebook Pages and Facebook Groups, towards highlighting and contributing to the culture. The *knowledge seekers* constitute who were raised within the community, are versed in the indigenous language and history, but perhaps moved away and are seeking the online groups to fulfill their sense of community, and/or to resolve the crisis of identity, for example when cultural expectations conflict with religious beliefs [25].

*6.1.1 Familiar Strangers: Community seekers* include born-towns who are not versed in the culture—and sometimes, the language. As with the “skip generation” [7], born-towns would be tutored on community culture if they sought it in person. In typical offline settings, membership verification (and thus a measure of trust) is effected through family ties, introduction by other trusted members of the community (as we were introduced to the elders in this research), being “sponsored”<sup>11</sup>, and for elder(s) discretion. In online spaces, the born-towns’ lack of language fluency served as a barrier in their quest to contextualize their cultural identity. This was especially so when involving discussion topics that touched upon discretionary and sacred [21] knowledge.

In the absence of one-on-one offline interactions, the online communities apply language fluency as means of verification and gate-keeping to ensure that sacred knowledge is handled appropriately. While this is a hurdle that can be surmounted by the born-towns with proximity to ancestral locations, it is not possible for those who are geographically distant and/or do not have in-person connections.

While designing technology to support *contributors* and *knowledge seekers* is a straightforward process: since they have consensus on leveraging indigenous dialect to mask sacred stories, and have contextual—often unsaid understanding of boundaries on what can be said online, the same is not true for *community seekers*. The knowledge the *community seekers* look for are sometimes against what can be shared in written form (this is not unlike the process we describe in the Methodology section). As it currently stands, designing to support *community seekers* would alienate the *contributors* and *knowledge seekers*, while the opposite would shut the *community seekers* out of accessing their IK.

Our design recommendations follow our own experience with conducting the work we present in this paper. Community buy-in on the need for the technology is important, and a workable design would provide a means for the *community seekers* to prove their identity and membership to the community (as we did using cultural liaisons) and thus allow a private or one-on-one sharing of secret/sensitive IK in an accessible language.

<sup>11</sup>Proximal term to the community phrasing. There is no English equivalent to how we would translate the term used by community to refer to a person who shepherds others through their rite(s) of passage.

**6.1.2 Access to Elders:** Facebook presented a low bar of entry with the cellphone service provider offering free and subsidized access to community members who already had Facebook accounts to participate in the online discussions. At the same time, the platform shut out older members of the community who did not have any online presence, and who may also have not been literate. There is a measure of trust of the members who converse in their local dialects, but the lack of elders as founts of knowledge means that these newly generated corpus instead creates a dividing line between the online and offline communities.

While a significant number of people in these groups, including interview participants straddle the online-offline divide, there yet remains a question of how to involve the counsels in these spaces. Community council of elders typically guide the approach to handling taboos [38], and also mediate, and provide guidance when there are conflicting narratives. This has been observed as community members (re)negotiated their societal structures that was faithful to the past and to the new values post-independence [25, 33]. Similarly, community members in different age-groups conflict in what they consider important, sacred and the measure of their cultural relevance. These cultural wicked problems [21, 44], also fall under the purview of the council of elders.

The current approach of using TV and radio programs geared towards cultural matters, offer a space where elders are active participants in the discussion of culture, but this limits the audience to the role of observers. These approaches also do not scale. We recommend two design considerations: (1) Support for elders participation in online spaces to guide the cultural boundaries and share their knowledge, and (2) a means of having younger elders be a bridge between the older counsels who inhabit the offline space, and the primarily online communities. This allows for the mantling of the younger elders to provide the elder services, while maintaining connection with offline spaces, bringing the two worlds together. Both of these support structures are currently lacking in the online space.

## 6.2 Community Roles and Gendered Participation

Of the five participants in this study who qualify to participate in the council of elders, only two had online presence, and only one was an active participant in online communities. Given the crucial roles that community elders play in negotiating cultural identity, their absence in online spaces, have resulted in modified roles, impacting gendered participation. The type of knowledge shared online is predominantly focused on men. There are two major causal reasons: (1) the women rites of passage being interrupted and with it, the conveyance of IK, and (2) majority of research literature on cultural practices of the Kalenjin, that serve as source materials for a lot of discussions, are written about men, from male perspectives [48]. Less represented in the online discourse regards the role of women, yet their roles are known to be distinct and complementary in the society [29, 61]. As we note in our findings, women seek to contextualize their cultural experience and bolster their IK in the online spaces, and there is an acknowledged need for the community to renegotiate how the rites of passage should be accomplished without the practice of FGM. But the lack of original

stories and contributions from the women who hold these IK do not have online presence (due to lack of formal education and/or infrastructure [70]), undermines this.

In the absence of counsels, the “elders” in the online communities are self-appointed. These placeholder elders give guidance on cultural boundaries that tended to follow stricter, more outdated forms of enforcement. While this is good for safeguarding sacred knowledge—at least until community consensus is established, it is not ideal for cases where community members need to discuss and disprove cultural practices that are considered taboos (such as FGM as noted throughout the paper). For the online community to serve as a true resource, elders sanction is needed for any negotiation to receive a buy-in by the larger community members. This has implications on technology designed to support and amplify the IK. Without the participation of elders who provide context and understanding of the respectful space [21, 23], the technology has the possible danger of undermining the community agency in story ownership.

We recommend that design approaches to support this involve both the elders (across genders) and the younger community members in a co-design/workshop activities in order to provide opportunities for the design of technologies that can be purpose built to both support and respect the cultural boundaries, yet have the space to discuss sensitive taboos especially those that are/have been perceived to be harmful.

## 6.3 Winds of Change: Evolving Culture and Emerging Conflicts

The online community highlighted the differentiation of the notion of “culture” vs “traditions” and what can be preserved. Culture it was understood, served as a vehicle to transmit traditions to a people. The community members being “borrowers” from previous generations, serving as stewards and “keepers” for the coming generations. Therefore, while the transmission (culture) changes, the content (traditions) does not.

Traditions are passed through the years and have embedded values. Eliciting those values would guide the re-interpretation into the current reality and identities. This is especially important as the community has continually evolved from a communal perspective and way of life, to individualistic perspective as a result of both colonialism and new laws post-independence.

The IK that is preserved in written text—and even those that are still practiced today, are those that are unchanged (i.e. traditions), with the community members’ identity tied to these abiding IK. For example, when describing the participants in the Methodology section, we explained how community members contextualized their stories using age-sets as markers of time. This approach additionally serves to cement their identity in the community. On the other hand, the disruption of the women rites of passage was due to conflict with laws and religious beliefs—a failed cultural evolution, which has impacted the (lack of) connected identity to the rite of passage. This extends to IK that are often shared in out-of-community settings with context stripped (as showcased in Figure 2).

<sup>12</sup>Images taken by first author during museum visit



**Figure 2: Examples of practices where context is stripped from traditional artifacts. Left panel showcases artifacts related to charms, but do not explain their use and who is charged with practicing it. Right panel does not explain the kind of medicine, the community that uses it and where the actual herbs are found. The IK associated with both of these artifacts are carefully held by the knowledge bearers who choose their knowledge successors<sup>12</sup>.**

Culture evolution is expected. This has been observed in music—as it has shifted from using the traditional string instruments, to playing the guitar at community halls to tens of people, to reaching thousands of people directly through transistor radios [10]. It is interesting to observe how community members reconcile their identities to cultural practices they wish to embody as the culture evolves. Understanding this, would lead to designing technology that can be used to support and highlight the renegotiation [33].

#### 6.4 Other Implications

While it is true that there is a technology divide that amplifies [55] the existing inequalities and favor those with money and access to internet [56], in this work we find that fluency of language, and knowledge of IK served as an equalizer across the community members. Most people who are fluent in Kalenjin either live in the rural areas, or were raised in the rural areas where the infrastructure is not as developed as the urban areas [70].

Even considering the negative aspects of Facebook use that we outline in our discussion, it still remains the most efficient forum for engagement with IK, especially as more adult users join the online communities. Community members find a space to interact with, and consider cultural opinions from other subgroups, alongside renegotiating their identity. The lack of elders as keepers of culture in online spaces is a concern, and this should be a consideration for any technology design for use in this space. Designers should take into account the lack of elder participation online and address them by considering other forms of participation. It is important to note, that the nature of participation need to support both the *production* (sharing of IK) and *consumption* (supporting discourse to aid the contextualization of culture). We discuss the role of video

in the production of IK for preservation, and the use of media (mostly call-in radios) in the consumption of IK. We also endorse that supporting both in one platform, considering the structural and formal educational challenges that exist while non-trivial, provide avenues for lasting solutions in supporting and amplifying IK.

We acknowledge the negative connotations and concerns regarding the congregation of indigenous communities online. This is mostly brought to the forefront due to the 2007 post-election clashes [13]. The use of the Kalenjin language by default in the online groups offer exclusivity and secrecy. There are no comprehensive online dictionary to assist in the translation—despite the fact that the language is spoken by over 6 million people. These concerns are chiefly political, as they weigh the probability of negative use of Facebook as an avenue for “ethnic intensification” [10] and a cause of “spatial tensions” [13].

Our study focuses on one indigenous community in Kenya. There is space for future work in contrasting how other indigenous communities, especially those situated in the African continent: seek and approach the preservation of their own Indigenous Knowledge. Understanding the role of elders and the opportunities and conflicts that technology brings in challenging or supporting the elders role in the community would offer great insights about the impact of technology and social media on community organizations.

**6.4.1 Extension of Design Recommendations:** Our design recommendations can be extended as follows:

(1) A design of a platform to support cultural sponsorship in the online community and the discussion of discretionary/sacred community-specific knowledge. (2) A wiki-style approach for sharing knowledge repository that respects cultural boundaries on what

can be shared, and by whom. Previously existing websites leveraged this means, but they were short-lived. (3) A way to incorporate elders in online community. They are the fulcrum surrounding IK discussion offline, and their absence in online spaces limit their expansion. (4) A space to support community consensus: where various versions of what is perceived as the original story can exist. This recommendation is borne out of our observations of how the knowledge-bearers told different versions depending on audience, age of community members, and their membership status.

This study was curtailed by the onsite of the COVID-19 pandemic, and we were not able to explore the process of how we as researchers can give back to the community through their own perspective. We consider this in ongoing and future work.

## 7 CONCLUSION

We examined how sentiments on preservation or amplification of indigenous knowledge (IK) manifest in the context of an indigenous community in Kenya. We interviewed members of the Kalenjin community and observed self-organized culture-focused communities represented in Facebook Pages and Groups, towards understanding what online and offline community members search for, and how their sentiments on what can be preserved and amplified compare. We then considered the implication for the scope and efficacy for technology.

Design considerations for technology for supporting and sustaining community-led initiative can be elicited by understanding what community members search for and how they approach the preservation and amplification of their own IK, and how they resolve any conflicts in approaches. We also believe that this work would inspire other research geared towards understanding, engaging, and/or preserving ICH, especially in the context of developing nations.

## ACKNOWLEDGMENTS

The authors would like to thank the participants who graciously shared their knowledge and time. We are indebted to you all. We also give thanks to Kogo Talai Chepkurgat (1928–2020) whose community introductions were invaluable. May her memory be a blessing. We would also like to thank Neelma Bhatti, Derek Haqq, Morva Saaty and Tim L. Stelter for their assistance with the paper methodology, and general feedback. Our thanks also to the anonymous reviewers whose feedback helped us to improve the clarity of this paper.

## REFERENCES

- [1] Mustafa Ali. 2014. Towards a Decolonial Computing.
- [2] Kagonya Awori, Frank Vetere, and Wally Smith. 2015. Transnationalism, Indigenous Knowledge and Technology: Insights from the Kenyan Diaspora. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (Seoul, Republic of Korea) (CHI '15). Association for Computing Machinery, New York, NY, USA, 3759–3768. <https://doi.org/10.1145/2702123.2702488>
- [3] Kagonya Awori, Frank Vetere, and Wally Smith. 2016. Sessions with Grandma: Fostering Indigenous Knowledge through Video Mediated Communication. In *Proceedings of the First African Conference on Human Computer Interaction* (Nairobi, Kenya) (AfriCHI'16). Association for Computing Machinery, New York, NY, USA, 1–11. <https://doi.org/10.1145/2998581.2998585>
- [4] Fikret Berkes. 2017. *Sacred Ecology*. Routledge, New York, New York, USA.
- [5] Michael L. Best and Amanda Meng. 2015. Twitter Democracy: Policy versus Identity Politics in Three Emerging African Democracies. In *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development* (Singapore, Singapore) (ICTD '15). Association for Computing Machinery, New York, NY, USA, Article 20, 10 pages. <https://doi.org/10.1145/2737856.2738017>
- [6] Nicola J. Bidwell. 2009. Anchoring Design in Rural Customs of Doing and Saying. In *Proceedings of the 12th IFIP TC 13 International Conference on Human-Computer Interaction: Part I* (Uppsala, Sweden) (INTERACT '09). Springer-Verlag, Berlin, Heidelberg, 686–699. [https://doi.org/10.1007/978-3-642-03655-2\\_75](https://doi.org/10.1007/978-3-642-03655-2_75)
- [7] Nicola J. Bidwell. 2016. Moving the centre to design social media in rural Africa. *AI & SOCIETY* 31, 1 (01 Feb 2016), 51–77. <https://doi.org/10.1007/s00146-014-0564-5>
- [8] Janet Blake. 2008. *UNESCOs 2003 Convention on Intangible Cultural Heritage: the implications of community involvement in 'safeguarding'*. Routledge, London, 59–87 pages.
- [9] Richard Caneba and Carleen Maitland. 2017. Native American Cultural Identity through Imagery: An Activity Theory Approach to Image-Power. In *Proceedings of the Ninth International Conference on Information and Communication Technologies and Development* (Lahore, Pakistan) (ICTD '17). Association for Computing Machinery, New York, NY, USA, Article 12, 12 pages. <https://doi.org/10.1145/3136560.3136581>
- [10] Robert E. Daniels. 1993. They're Playing Our Song: Media and Ethnicity in Kenya. <https://www.danielsanthropology.com/papers/OurSong/Oursong193.html>.
- [11] Paul Dourish and Scott D. Mainwaring. 2012. UbiComp's Colonial Impulse. In *Proceedings of the 2012 ACM Conference on Ubiquitous Computing* (Pittsburgh, Pennsylvania) (UbiComp '12). Association for Computing Machinery, New York, NY, USA, 133–142. <https://doi.org/10.1145/2370216.2370238>
- [12] Peter Gallert, Heike Winschiers-Theophilus, Gereon K. Kapuire, Colin Stanley, Daniel G. Cabrero, and Bobby Shabangu. 2016. Indigenous Knowledge for Wikipedia: A Case Study with an OvaHerero Community in Eastern Namibia. In *Proceedings of the First African Conference on Human Computer Interaction* (Nairobi, Kenya) (AfriCHI'16). Association for Computing Machinery, New York, NY, USA, 155–159. <https://doi.org/10.1145/2998581.2998600>
- [13] M Christian Green. 2014. From Social Hostility to Social Media: Religious pluralism, human rights and democratic reform in Africa. *African Human Rights Law Journal* 14 (01 2014), 93 – 125.
- [14] Edward Twitchell Hall. 1983. *The Dance of Life: The Other Dimension of Time*. Anchor Press, Garden City, New York, USA.
- [15] KassFM International. 2019. County Focus: Lembus Seeking Separation from Tugen Sub-Tribe. <https://www.youtube.com/watch?v=ekrK63ciqSw>.
- [16] Lilly Irani, Janet Vertesi, Paul Dourish, Kavita Philip, and Rebecca E. Grinter. 2010. Postcolonial Computing: A Lens on Design and Development. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Atlanta, Georgia, USA) (CHI '10). ACM, New York, NY, USA, 1311–1320. <https://doi.org/10.1145/1753326.1753522>
- [17] Azra Ismail and Neha Kumar. 2019. Empowerment on the Margins: The Online Experiences of Community Health Workers. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland Uk) (CHI '19). Association for Computing Machinery, New York, NY, USA, 1–15. <https://doi.org/10.1145/3290605.3300329>
- [18] Nobert Jere, Ndahafa Mungonena, and Anicia Peters. 2016. Social Media Usage in Africa and Its Ethical Implications. In *Proceedings of the First African Conference on Human Computer Interaction* (Nairobi, Kenya) (AfriCHI'16). Association for Computing Machinery, New York, NY, USA, 263–266. <https://doi.org/10.1145/2998581.2998617>
- [19] Asnath Paula Kambunga, Heike Winschiers-Theophilus, and Rachel Charlotte Smith. 2020. Participatory Memory Making: Creating Postcolonial Dialogic Engagements with Namibian Youth. In *Proceedings of the 2020 ACM Designing Interactive Systems Conference* (Eindhoven, Netherlands) (DIS '20). Association for Computing Machinery, New York, NY, USA, 785–797. <https://doi.org/10.1145/3357236.3395441>
- [20] Carrie Karsgaard and Maggie MacDonald. 2020. Picturing the pipeline: Mapping settler colonialism on Instagram. *New Media & Society* 22, 7 (2020), 1206–1226. <https://doi.org/10.1177/1461444820912541>
- [21] Lindah Kotut, Neelma Bhatti, Morva Saaty, Derek Haqq, Timothy L. Stelter, and D. Scott McCrickard. 2020. Clash of Times: Respectful Technology Space for Integrating Community Stories in Intangible Exhibits. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '20). Association for Computing Machinery, New York, NY, USA, 1–13. <https://doi.org/10.1145/3313831.3376354>
- [22] Lindah Kotut and Scott D McCrickard. 2021. Trail as Heritage: Safeguarding Location-Specific and Transient Indigenous Knowledge. In *3rd African Human-Computer Interaction Conference: Inclusiveness and Empowerment* (Maputo, Mozambique) (AfriCHI 2021). Association for Computing Machinery, New York, NY, USA, 94–102. <https://doi.org/10.1145/3448696.3448702>
- [23] Lindah J. Kotut. 2021. *Amplifying the Griot: Technology for Preserving, Retelling, and Supporting Underrepresented Stories*. Ph.D. Dissertation. Virginia Polytechnic Institute and State University, Blacksburg, VA, USA.
- [24] KTN. 2018. Culture Quest: The Tugen. <https://www.youtube.com/watch?v=ekrK63ciqSw>.
- [25] Mrrtle S. Langley. 1979. *The Nandi of Kenya: Life Crisis Rituals in a Period of Change*. C. Hurst & Co., London, United Kingdom.



- [26] Federico Lenzerini. 2011. "Intangible Cultural Heritage: The Living Culture of Peoples". *European Journal of International Law* 22, 1 (02 2011), 101–120. <https://doi.org/10.1093/ejil/chr006>
- [27] Lucas Lixinski. 2013. *Intangible Cultural Heritage in International Law*. Oxford University Press, Oxford, United Kingdom.
- [28] Gabrielle Lynch. 2011. *I Say to You: Ethnic Politics and the Kalenjin in Kenya*. University of Chicago Press, Chicago, Illinois, USA.
- [29] Giorgia Magni. 2017. Indigenous knowledge and implications for the sustainable development agenda. *European Journal of Education* 52, 4 (2017), 437–447.
- [30] Isaac Mbiti and David N Weil. 2015. Mobile banking: The impact of M-Pesa in Kenya. In *African Successes, Volume III: Modernization and Development*. University of Chicago Press, Chicago, IL, USA, 247–293.
- [31] Konte News. 2019. Tulwap Kipsigis: A Kalenjin Dispersal Point as Described by Mzee Joseph Koskei. <https://www.youtube.com/watch?v=7SJql-7NbWA>.
- [32] Anja Nygren. 1999. Local Knowledge in the Environment—Development Discourse: From dichotomies to situated knowledges. *Critique of Anthropology* 19, 3 (1999), 267–288. <https://doi.org/10.1177/0308275X9901900304> arXiv:<https://doi.org/10.1177/0308275X9901900304>
- [33] Regina Smith Oboler. 1985. *Women, Power, and Economic Change: The Nandi of Kenya*. Stanford University Press, Stanford, California, USA.
- [34] Erick Oduor, Carman Neustaeder, Tejinder K. Judge, Kate Hennessy, Carolyn Pang, and Serena Hillman. 2014. How Technology Supports Family Communication in Rural, Suburban, and Urban Kenya. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Toronto, Ontario, Canada) (CHI '14). Association for Computing Machinery, New York, NY, USA, 2705–2714. <https://doi.org/10.1145/2556288.2557277>
- [35] Bethwell A Ogot, CE Ehret, JEG Sutton, and WR Ochieng. 1976. *Kenya Before 1900*. East African Publishing House, Nairobi, Kenya.
- [36] Orinda Shadrack Okumu. 2016. *The concept of intangible cultural heritage in Kenya* (1 ed.). UCL Press, London, 45–58. <http://www.jstor.org/stable/j.ctt1gxxpc6.10>
- [37] Naresh R Pandit. 1996. The Creation of Theory: A Recent Application of the Grounded Theory Method. *The Qualitative Report* 2, 4 (1996), 1–14.
- [38] Okot p'Bitek. 2013. *Song of Lawino & song of Ocol*. Waveland Press, Long Grove, Illinois, USA.
- [39] Anicia Peters, Michael Oren, and Nicola Bidwell. 2012. Namibian and American Cultural Orientations toward Facebook. In *CHI '12 Extended Abstracts on Human Factors in Computing Systems* (Austin, Texas, USA) (CHI EA '12). Association for Computing Machinery, New York, NY, USA, 2603–2608. <https://doi.org/10.1145/2212776.2223843>
- [40] Mike Pflanz. 2006. Kenyans welcome home sacred relics stolen by British. <https://www.telegraph.co.uk/news/worldnews/africaandindianocean/kenya/1515836/Kenyans-welcome-home-sacred-relics-stolen-by-British.html>
- [41] Kopano Ratele. 2007. Native Chief and White Headman: A Critical African Gender Analysis of Culture. *Agenda: Empowering Women for Gender Equity* 72 (2007), 65–76. <http://www.jstor.org/stable/27739275>
- [42] Thomas Reitmaier, Nicola J. Bidwell, and Gary Marsden. 2011. Situating digital storytelling within African communities. *International Journal of Human-Computer Studies* 69, 10 (2011), 658–668. <https://doi.org/10.1016/j.ijhcs.2010.12.008> Locative media and communities.
- [43] Safaricom. 2020. Free Facebook. <https://www.safaricom.co.ke/faqs/faq/520>.
- [44] Norman W. Sheehan. 2011. Indigenous Knowledge and Respectful Design: An Evidence-Based Approach. *Design Issues* 27, 4 (2011), 68–80. <http://www.jstor.org/stable/41261957>
- [45] Robert Siele. 2018. Ngo'lyonditab Setyot: Mwoe Boisiekab Kipsigis Kole Tomo Kotapten Ketotok (Translated: The word on Setyot: Kipsigis Elders Have Determined that the Setyot Has Not Flowered). [https://www.youtube.com/watch?v=vI2z\\_JsBrNo](https://www.youtube.com/watch?v=vI2z_JsBrNo).
- [46] Peter Simatei. 2010. Kalenjin popular music and the contestation of national space in Kenya. *Journal of Eastern African Studies* 4, 3 (2010), 425–434.
- [47] J.P. Singh. 2011. *UNESCO: Creating Norms for a Complex World*. Routledge, New York, New York, USA.
- [48] Geoffrey Stuart Snell. 1954. *Nandi Customary Law*. Macmillan, London, UK.
- [49] Kate Starbird and Leysia Palen. 2011. "Voluntweeters": Self-Organizing by Digital Volunteers in Times of Crisis. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Vancouver, BC, Canada) (CHI '11). Association for Computing Machinery, New York, NY, USA, 1071–1080. <https://doi.org/10.1145/1978942.1979102>
- [50] Brit Stichel, Edwin Blake, Donovan Maasz, Colin Stanley, Heike Winschiers-Theophilus, and Helena Afrikaner. 2019. Namibian Indigenous Communities Reflecting on Their Own Digital Representations. In *Proceedings of the 9th International Conference on Communities & Technologies - Transforming Communities* (Vienna, Austria) (C&T '19). Association for Computing Machinery, New York, NY, USA, 51–59. <https://doi.org/10.1145/3328320.3328378>
- [51] Anselm Strauss and Juliet Corbin. 1994. Grounded Theory Methodology. *Handbook of Qualitative Research* 17 (1994), 273–85.
- [52] Dagny Stuedahl and Christina Mörtberg. 2012. *Heritage knowledge, social media, and the sustainability of the intangible*. Routledge, Oxford, 106–125.
- [53] J.E.G. Sutton. 1979. *The Kalenjin*. East African Publishing House, Nairobi, Kenya.
- [54] Jennyfer Lawrence Taylor, Alessandro Soro, Paul Roe, Anita Lee Hong, and Margot Brereton. 2017. Situational When: Designing for Time Across Cultures. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (Denver, Colorado, USA) (CHI '17). Association for Computing Machinery, New York, NY, USA, 6461–6474. <https://doi.org/10.1145/3025453.3025936>
- [55] Kentaro Toyama. 2011. Technology As Amplifier in International Development. In *Proceedings of the 2011 iConference* (Seattle, Washington, USA) (iConference '11). ACM, New York, NY, USA, 75–82. <https://doi.org/10.1145/1940761.1940772>
- [56] Kentaro Toyama. 2015. *Geek Heresy: Rescuing Social Change from the Cult of Technology*. PublicAffairs, New York, USA.
- [57] Anupriya Tuli, Shruti Dalvi, Neha Kumar, and Pushpendra Singh. 2019. "It's a Girl Thing": Examining Challenges and Opportunities around Menstrual Health Education in India. *ACM Trans. Comput.-Hum. Interact.* 26, 5, Article 29 (July 2019), 24 pages. <https://doi.org/10.1145/3325282>
- [58] UNESCO. 2003. Text of the Convention for the Safeguarding of the Intangible Cultural Heritage. <https://ich.unesco.org/en/convention>.
- [59] UNESCO. 2011. 2003 Convention for the Safeguarding of the Intangible Cultural Heritage. <https://ich.unesco.org/doc/src/15164-EN.pdf>.
- [60] UNESCO. 2015. Ethical Principles for Safeguarding Intangible Cultural Heritage. <https://ich.unesco.org/en/Decisions/10.COM/15.a>.
- [61] UNESCO. 2017. Local Knowledge, Global Goals. [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/ILK\\_ex\\_publication\\_E.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/ILK_ex_publication_E.pdf).
- [62] Maja Van der Velden. 2013. Decentering Design: Wikipedia and Indigenous Knowledge. *International Journal of Human-Computer Interaction* 29, 4 (2013), 308–316.
- [63] Aditya Vashistha, Edward Cutrell, Gaetano Borriello, and William Thies. 2015. Sangeet Swara: A Community-Moderated Voice Forum in Rural India. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Seoul, Republic of Korea) (CHI '15). Association for Computing Machinery, New York, NY, USA, 417–426. <https://doi.org/10.1145/2702123.2702191>
- [64] Morgan Vigil-Hayes, Marisa Duarte, Nicholet Deschine Parkhurst, and Elizabeth Belding. 2017. #Indigenous: Tracking the Connective Actions of Native American Advocates on Twitter. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing* (Portland, Oregon, USA) (CSCW '17). Association for Computing Machinery, New York, NY, USA, 1387–1399. <https://doi.org/10.1145/2998181.2998194>
- [65] Michalis Vitos, Julia Altenbuchner, Matthias Stevens, Gillian Conquest, Jerome Lewis, and Muki Haklay. 2017. Supporting Collaboration with Non-Literate Forest Communities in the Congo-Basin. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing* (Portland, Oregon, USA) (CSCW '17). Association for Computing Machinery, New York, NY, USA, 1576–1590. <https://doi.org/10.1145/2998181.2998242>
- [66] Elizabeth Warrick, Jennifer Preece, Jedidah Kibutu, and Ben Sihanya. 2016. Social Media as an Indigenous Information World For Environmental Stewardship. In *Proceedings of the First African Conference on Human Computer Interaction* (Nairobi, Kenya) (AfriCHI'16). Association for Computing Machinery, New York, NY, USA, 126–137. <https://doi.org/10.1145/2998581.2998587>
- [67] F. B. Welbourn. 1968. Keyo Initiation. *Journal of Religion in Africa* 1, 2 (1968), 212–232. <http://www.jstor.org/stable/1594802>
- [68] Heike Winschiers-Theophilus, Nicola J. Bidwell, Shilumbe Chivuno-Kuria, and Gereon Koch Kapuire. 2010. Determining Requirements Within an Indigenous Knowledge System of African Rural Communities. In *Proceedings of the 2010 Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists* (Bela Bela, South Africa) (SAICSIT '10). ACM, New York, NY, USA, 332–340. <https://doi.org/10.1145/1899503.1899540>
- [69] Heike Winschiers-Theophilus, Shilumbe Chivuno-Kuria, Gereon Koch Kapuire, Nicola J. Bidwell, and Edwin Blake. 2010. Being Participated: A Community Approach. In *Proceedings of the 11th Biennial Participatory Design Conference* (Sydney, Australia) (PDC '10). Association for Computing Machinery, New York, NY, USA, 1–10. <https://doi.org/10.1145/1900441.1900443>
- [70] Susan P. Wyche, Andrea Forte, and Sarita Yardi Schoenebeck. 2013. Hustling Online: Understanding Consolidated Facebook Use in an Informal Settlement in Nairobi. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Paris, France) (CHI '13). Association for Computing Machinery, New York, NY, USA, 2823–2832. <https://doi.org/10.1145/2470654.2481391>
- [71] Susan P. Wyche and Rebecca E. Grinter. 2012. "This is How We Do It in My Country": A Study of Computer-Mediated Family Communication among Kenyan Migrants in the United States. In *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work* (Seattle, Washington, USA) (CSCW '12). Association for Computing Machinery, New York, NY, USA, 87–96. <https://doi.org/10.1145/2145204.2145222>
- [72] Susan P. Wyche, Sarita Yardi Schoenebeck, and Andrea Forte. 2013. "Facebook is a Luxury": An Exploratory Study of Social Media Use in Rural Kenya. In *Proceedings of the 2013 Conference on Computer Supported Cooperative Work* (San Antonio, Texas, USA) (CSCW '13). Association for Computing Machinery, New York, NY, USA, 33–44. <https://doi.org/10.1145/2441776.2441783>