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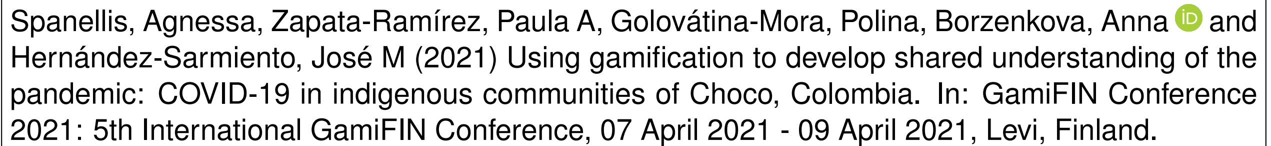

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Using gamification to develop shared understanding of the pandemic: COVID-19 in indigenous communities of Choco, Colombia

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Abstract

Effective communication with local communities is a critical factor in containing an outbreak. However, simply broadcasting "expert" knowledge carries a risk of being rejected, particularly in indigenous communities that traditionally rely on ancestral knowledge. This paper presents an investigation into developing a shared understanding of COVID-19 in indigenous communities of Choco, Colombia, that could help them develop effective mitigating practices, while being respectful of their believes. Unstructured interviews and observations were used to explore how indigenous communities perceive and respond to COVID-19. Based on these, a communicative strategy was developed using participatory design and gamification approach, that aimed at bridging their beliefs and traditional ancestral medicine with the official medical recommendations for prevention of the virus transmission.

The findings revealed that the intervention became a trigger for mindful discussion within indigenous communities about the preventive measures from the virus, while gamification elements acted as an enabler of such discussion and created more trusting attitude towards the recommendations. Based on the initial findings, we discuss challenges of conducting indigenous research, including the role of trust between researchers and the communities, gamification as an enabler of shared knowing of a problem matter, and the importance of flexible participatory research methods whereby indigenous people are treated not as mere researched, but as full participants of the study.

Keywords 1
Gamification, Communicative strategy, COVID-19, Indigenous communities, Narrative, Infodemic, Choco

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1. Introduction

Communication with local communities is crucial during an outbreak or a pandemic in an effort to control the spread of a virus [1]. Failure to do so (effectively) was particularly evident during the most recent and still ongoing COVID-19 pandemic. It can lead to the spread of misinformation [2] and the phenomenon called infodemic, defined as over-abundance of information, some accurate and some not making it hard to find trustworthy sources and

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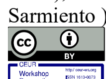

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reliable guidance when needed [3], [4], or create an information vacuum, if the communities cannot understand or do not trust the information provided [5]. In such instances, the communities create their own interpretation of the new situation and develop coping strategies.

This paper presents the first results of the research project conducted in the Choco region of Colombia. The aim of the project was to conduct a seroprevalence survey in the region to estimate the spread of the virus in the indigenous territories and to design a communicative strategy that includes the World Health Organization (WHO) recommendations of the preventive measures during the pandemic, which would be respectful of traditional beliefs of the indigenous peoples. We used gamification techniques to engage the communities in the discussion of the recommendations, while being respectful of their traditional beliefs, and to facilitate acceptance of and trust in the provided recommendations. We then combined these insights with the results of the seroprevalence survey to observe the differences in perceptions and behaviors of the infected and other community members. The preliminary results showed that the use of Easter Eggs technique combined with the visual representation of the imaginary world engaged all groups within the communities and made them more trusting of the recommendations. When the communication was combined with the results of the tests, the community members were more inclined to follow the recommendations, e.g. self-isolation.

In the next section we discuss the research context and design, followed by the development of the communicative strategy. Then the paper presents preliminary results, followed by the discussion of gamification as an effective technique for communication and the challenges of conducting research in indigenous communities.

2. Methodology

Indigenous communities have traditionally been subject to colonization and imperial practices, and marginalization by Eurocentric values [6]. This created a sense of distrust to the dominant culture and its histories [7]. Such mindset implicitly favors conventional research methods from "Western" university contexts [8], whereby indigenous peoples are the ones researched and used to advance selected research objectives [9]. In response to the dominating paradigm and attempts to decolonize indigenous research, indigenous research methodologies emerged combining research practices that give indigenous communities a voice [7] and project indigenous epistemologies [8].

Indigenous research methodologies are participatory, flexible and respectful of the language, culture and worldview of the indigenous communities [10], [11], striving to develop shared ways of knowing and bridge two worlds [7]. When engaging with indigenous communities, researchers have to be accountable to the communities, and thus research methods cannot be reigned supreme by the Western notion of the scientific method. These considerations shaped our choices of methods for data collection, design of the intervention and data analysis.

2.1. Research context

The Choco region in Colombia is located in the remote areas on the Pacific coast and has an approximate population of 65,000, living in about 120 native territories and speaking six different languages (Table 1). The indigenous settlements live inland between the coast and the Andes with almost no road infrastructure. The main means of transportation is the canoe. They do not have access to digital communication technology, have low levels of literacy and are partially surrounded by criminal gangs (paramilitary, guerrillas and drug cartels). All these factors make access to the national healthcare system problematic. Thus, when the pandemic started, there was almost no engagement and support provided from the healthcare and government officials.

The lack of engagement meant the communities were left on their own to face the unknown. Together with the national lockdown this also led to the intensification of criminal activities [12]. The above description of the context outlines the challenges of conducting research in remote indigenous communities. At the same time, they dignify the importance of and the need for such engagement.

2.2. Research design

To align with the principles of the chosen research methodology and maintain trusting relations with the indigenous communities, the research team chose unstructured interviews for data collection. The field investigator is a medical expert and has had a continuous research program in the region over the past 10 years, and therefore has already gained their trust. According to the researcher, unstructured interviews in the form of discussion are the most acceptable form of engagement for these communities. The field material was captured in field notes and through subsequent interviews of the field investigator by the rest of the research team, as the indigenous communities did not want to be recorded.

The research team was interested in understanding the emergent behavior [13] during the pandemic and the indigenous knowledge that the communities were using to build resilience against the current vulnerability [14]. This includes exploring how they perceive current risk [15], what coping strategies, experimental practices and associated responses they have developed so far [14], how they assign trust to information [16], and historic memories they have of similar emergencies, e.g. epidemics and outbreaks of other viruses present in the region [17].

The initial interviews were conducted in the town of Quibdó, one of the two regional centers, where the field investigator had discussions with the leaders of indigenous communities, who came there to trade with each other and procure additional supplies for their communities. Adult men and women from six communities participated in this study. Details of the interviewed population are presented in Table 1. The interviews were complemented with observation notes and photographic materials. For instance, the field investigator saw a mural in a community center, and took photos of it that provided ideas for the aesthetics of the communication materials.

Table 1
Indigenous communities of Choco

Indigenous people	N of Interviewees	Share of population
Embera Chami	74	12 %
Embera Katio	51	8 %
Embera Dobida	395	66 %
Wounann	25	4 %
Kuna Tule	19	3 %
Others	64	7 %

The initial findings were analyzed using thematic analysis [18] and provided the basis for communicative materials. The materials were designed in the form of a poster, which met the constraints of the local environment, i.e. a low-tech solution for the communities with limited access to information and communication technologies. Local artists and translators were involved in all stages of the design to ensure participatory approach of the poster development.

We considered gamification to be an appropriate approach, because playing is essential to any human culture [19], including indigenous peoples, who have been using games to share their knowledge and traditions [20]. With the rise of video games, these games gave rise to the movement of indigenous game design and development [21], which among other are used for learning [22] and as a source of self-exploration [20]. We considered a poster to be a suitable medium of representation due to the local constraints, i.e. lack of access to the digital communication technology.

Then the posters were delivered to the communities and placed in the communal areas, and their effectiveness as well as the results of the project were evaluated using unstructured interviews and observations. Other methods, such as surveys, were not considered as they created a risk of losing fragile trust of the communities to the lead investigator. From previous experience, even recording interviews and group discussions posed a problem.

3. Development of the intervention

The development of the communicative strategy followed a cycle of three phases. In the first phase, we analyzed the perception of the pandemic and identified the insights that were critical to being incorporated in the design. This phase was followed by the design of the poster and incorporation of the gamification elements in it. The initial designs were then tested with the communities and their recommendations were incorporated in the design. This cycle formed the basis for several iterations.

3.1. Perception of the pandemic

Although some of the interviewees expressed fear of the uncertainty that came with the pandemic, many questioned why so much

attention and resources are dedicated to this disease, noting that we do not have a cure for it, while other diseases spread in the region are more dangerous and can be treated. This remark showed that indigenous communities distrust the system rather than modern medicine.

So far there has been little engagement from the government healthcare authorities with the indigenous communities, e.g. medics came once to test some communities, but never shared the results of the tests. This added to the already existing distrust to the "Westerners" manifested as "white". At the time of the first interviews, there have been no confirmed deaths from COVID-19 within the communities. The only two confirmed deaths were local leaders who went to the local hospital. Their bodies were not returned to the communities, and this is considered for them worse than death, as they could not organize a proper burial ceremony. This incident further undermined trust in the recommendations on how to protect the communities from the pandemic. For instance, the communities refused to wear masks.

However, this distrust was not projected on the field investigator who has been engaged with the community for over 10 years. During the initial interviews, the field investigator discussed the official recommendations, in particular the importance of self-isolating at the community level. As a result, the community leaders stopped travelling to the towns, including Quibdó, and so the team had to adjust the background research process.

The communities were quite observant of any changes and were able to trace the spread of the disease to an individual who brought it to the village. They observed that the virus affects elderly more. They do not believe that it originated from the animals, because they would have known about it, as they live among animals. They concluded that it was a man-made virus designed to eradicate indigenous knowledge and wisdom held by the elders. They emphasized that everyone is affected because "Westerners" destroyed the balance between nature and men, and criticized capitalism as it disregards many forms of life.

They have developed their own ways of protecting themselves. Local spiritual leaders – *Jaibanas* – and herbal healers – *Hierbateros* – believe that the virus will not stick to bitter blood. Thus, they recommended drinking herbal tea with lemon, ginger, and elderflower and bathing with gliricidia (*mata raton*). They have also developed ritual ceremonies to protect from the virus, whereby the spiritual leaders spit on those participating.

3.2. Communicative strategy development

The design process started with analyzing the official WHO recommendations that should be included or omitted from the posters, and which would be respectful of the traditional knowledge and beliefs of the communities that were identified during the background research. Then the team selected an overall theme for the poster and made nuanced design choices that also incorporated some of the gamification principles. Finally, the team incorporated additional gamification elements to further strengthen the persuasive design of the poster.

Main recommendations

To counteract the perception about the man-made origins of the virus, the researchers included a message about animal origins; however, the message also emphasized that it came from animals that were kept in captivity and treated with disrespect. This way, the message was not confronting the indigenous people's beliefs, but rather mirroring and resonating with the appreciation of the nature.

Then the team included the message explaining why the virus is so dangerous (long incubation period), and why social distancing (of 2 meters) might help to reduce the spread. However, the recommendation was made for social distancing at a community level, because maintaining social distancing within small and dense communities might not be feasible.

The team included the message about washing hands, but not wearing masks or going to the hospital for those in critical conditions. These messages were omitted partially because the communities were particularly negative about these recommendations, and therefore the research team faced the risk of undermining trust in all the other recommendations. In any case, local health centres are ill-equipped to provide help to critically ill patients. Furthermore, the communities live in open and very well ventilated huts with no walls, which reduces the risk of airborne transmission and the need for masks [23].

The team included a message explaining the symptoms and recommending to self-isolate at

home for those who exhibit the symptoms. Finally, the team recommended to drink herbal drinks to bridge indigenous traditions with modern medicine, but emphasised the use of personal plates and cups, explaining that the virus might be transmitted through the saliva.

Design choices

After several discussions and design iterations, the team decided to use an indigenous village as an overall theme of the poster. The "virtual" village is located in a valley and separated from the "outside" world by a mountain range. The messages associated with the origins of the virus and its impact on the world were placed in that spot. All the other recommendations were placed in different parts of the village. Different elements of the village resembled that of real villages, e.g. the shape of the huts, people and their clothes, or various objects, such as dishes and stairs. Clothes were adjusted for different indigenous groups.

With regards to the specific elements, several design choices were made to further reinforce the recommendations and "bridge" the two worlds. In the outside world, the animals linked to the origins of the virus were depicted in cages to further emphasize the disrespectful treatment of nature and the unbalance between people and nature. In order to show that the whole world is affected, the team depicted people of different races and age groups. People depicted in the village were adults, but not elderly. This choice was made to de-emphasize the perception that the virus mainly targets the elderly.

Different everyday life attributes were depicted faithful to the real environment. For instance, when recommending washing hands, the poster shows a plastic water tank rather than a tap, since most of the villages do not have plumbing, and people bring water in plastic containers from the nearest river.

Finally, the team used a distinctive icon throughout the poster to symbolise the virus. The icon was placed on all the "infected" characters showing where the virus "lives" (in the chest). Thus, the team reinforced the message about the nature of the disease.

Gamification elements

From the beginning, the research team was planning to use gamification techniques as a medium for narrating the recommendations and helping the community to develop a shared understanding of the new emergency. The team considered different approaches, e.g. comic-based storytelling [24] or completing mini-quests for readers to solve [25]. Eventually, the team created a metaphoric "virtual world" [26], [27] that mimicked the real world, and yet represented its idealistic version with beautiful environment and in bright colors. Although the term "virtual world" normally refers to a digital environment, it was considered appropriate in this study as the graphic representation of the world served the same purpose.

This world depicted how traditional houses look like, although the photographic evidence showed that some families deviate from this structure. Men and women were dressed up in traditional clothes, wearing colorful bead (*chaquira*) necklaces, embroidered pieces (*molas* of the Kuna Tule culture), and covering their bodies with traditional ornaments made with genip (*jagua*) and achiote (*Bixa Orellana)* plants, while attending to their everyday chores. However, indigenous people wear these attributes mainly during festivals and spiritual ceremonies, although some elements are also used in day-to-day practices and this is reflected in the choice of ornaments. Such an amplified virtual world provided an environment for them to celebrate their identity [26].

Within this world, the recommendations and other relevant information were narrated through mini-storytelling [28], [29]. It was used to contextualize impersonal recommendations [30] and further strengthen the link with the identity of indigenous communities. Thus, the verbal messages were informative rather than affirmative in nature, engaging the participants in a dialogue with the poster.

The mini-stories were narrated by an avatar that impersonated a community leader. The status of the avatar was visualised through circular body tattoo patterns, which are only used by spiritual leaders [31]. This element aimed to further the impression that the recommendations came from within, rather than imposed by the "outside" world, whereby the avatar engaged with each of them individually [32].

Additionally, the team hid the animals inhabiting Choco region in different parts of the poster close to the most important messages concerning mitigating recommendations, and community members were invited to find all of them. For instance, a hummingbird was flying near a flower on the hair of the lady with a water tank, drawing attention to the message about

washing hands. This technique resembles puzzles in hidden object games, a typical example of which is Where's Wally? puzzle books, and is also sometimes referred to Easter Eggs technique as a form of variable rewards [33]. This technique allowed us to draw attention to specific recommendations and engage them in exploration of the poster [34]. Figure 1 shows the final design of the poster.

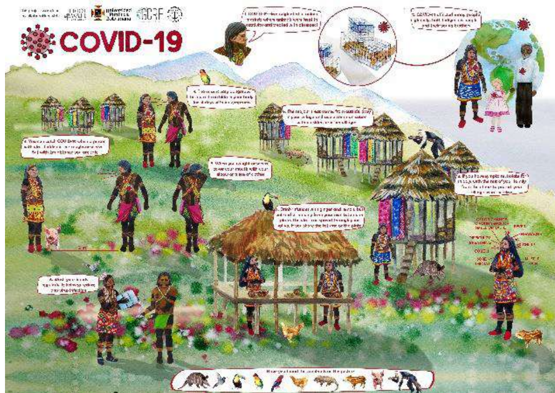

Figure 1: COVID-19 poster for Embera group.

3.3. Participative design

Throughout the design phase, individual visual artworks and and prototypes of the poster were continuously shared with the local artists and community leaders to ask for their feedback and suggestions. For instance, the first sketches of houses and stairs were modelled based on the photos from the field trips, but the community leaders and the local artists noted that they did not look traditional enough, so they were changed to more traditional looking huts. This change improved the visual aesthetics of the poster significantly.

Among other changes, the community leaders commented that the first versions of the women on the poster were too skinny and light in complexion, which might have reflected the implicit perception of our western standards of beauty. They also commented on the colours of the clothes and representation of body tattoos.

The community leaders suggested numbering all the messages, as it made it easier for them to follow. Furthermore, there were suggestions of moving different parts of the message to improve clarity of the poster, and comments on some attributes, and the clothes and appearance of indigenous men.

When the design was finalized, the poster was translated into six language (Spanish and five indigenous languages) by local teachers.

4. Results and discussion

4.1. Overview of the results

The poster was printed in 140x100 cm size and the field researchers completed several field trips to deliver them to different communities and continue conducting seroprevalence survey. At the time of writing this paper, the team still had several trips planned to visit the remaining villages and continue monitoring changes in behavior of the indigenous communities.

The poster was placed in community areas where people normally gather to discuss community matters. Figure 2 shows the poster displayed in a common area of one of the communities. The researchers would place the poster in the morning and explain to the community what the main recommendations were, then they would conduct tests and attend to other medical matters, and finally they would informally interview different members about their impressions of the posters. They would then complement these reports with their own observations and photos of people interacting with the poster.

Figure 2: Placement of the poster in the community center.

From the first impression, the communities liked the virtual world, because they could identify with it and recognize themselves with it. They liked the bright colors of the poster that

were more representative of their local and domestic life attributes and artefacts, e.g. female skirts (*parunas*), tableware (*totumos*) or colorful clothes in the huts, than standardized "Western" looking infographics. In one village, they were amazed by how accurate the representation of the people on the poster was, reflecting their own identity. Men liked women characters in particular and found them very beautiful.

Kids were the first to engage with animals and were spending a long time in front of the poster together trying to find different animals. After some time, adults would join them and engage with them in the discussion of what was written on the poster. Thus, the Ester Eggs technique served as a tool to indirectly engage adults through the initial excitement of kids, whereby both groups paid greater attention to the recommendation through mutual engagement.

The researchers did not observe the same attention being paid to the avatar, although on one of the photos a community leader points distinctively on the avatar, when explaining to the community what was written on the poster. In contrast, a black man with grey hair wearing a white shirt representing part of the rest of the world attracted a lot of attention. They perceived him as a man of importance and asked who he was. It is important to note that indigenous peoples do not distinguish between different races; instead, they divide the world into indigenous population and the rest of the people – their "smaller brothers".

Regarding the changes in behavior, in some villages the researchers observed that at the beginning teenagers behaved carelessly, but once they learnt that their test results were positive, they started self-isolating, following the recommendations on the poster. In other villages, such behavior was observed among older people. In some villages, people even started wearing masks. This might indicate that although they had been aware of the WHO recommendations, they have become more perceptive to them. However, a longitudinal study would need to be conducted to estimate whether the implemented intervention brought about long-term behavioral changes, e.g. if people started washing hands more regularly.

In many villages, people showed appreciation of the messages written in their own indigenous language, which made them more attentive to the poster. In one village, mothers asked if the team could share A4 printouts with them to take home, so that they can use it as an education material to teach their kids their language in writing, as there almost no materials available. In another village, people did not recognize their own language at first, because they are used to receiving written materials in Spanish, but once they learnt about it, they became more attentive.

The impact of the findings is two-fold. First, it provides a basis for discussing whether and how gamification can be used in indigenous research. Second, the findings are illustrative of the challenges of conducting indigenous research that might inform future similar studies. Furthermore, they challenge the prevailing perception of what constitutes a rigorous research and call for a more nuanced attention to a study context.

4.2. Gamification as a medium of communication

The pandemic is an emergency event that disrupted lives of indigenous peoples [13]. In this study, gamification was used to develop a common understanding of the disease, the pandemic, its effects and mitigating practices. Although the developed poster did not convince the communities of the official view of the origins of the virus, as we have not found evidence that they stopped believing that the virus is man-made, the intervention became a catalyst of the discussion about the preventive measures. Some of these measures (e.g. washing hands) might help to protect the communities against other disease beyond the pandemic.

We have observed that the virtual world was the first aspect of the poster that attracted and engaged the users. Virtual worlds are an essential component of a game, creating a fantasy, which however resembles elements of the real world [35]. Virtual worlds enable an immersion with the gamified environment [26], but this only happens if they identify with the world at a level sufficient to consider themselves representative and a good fit in the world. This might partially explain why standardized infographics with pandemic recommendations, which the indigenous communities have seen before, did not persuade them to listen to the recommendations. This also points in the direction of identity and the

important of this concept, which the research team initially attempted to project through the avatar.

The initial observations showed that the avatar representing a spiritual leader went unnoticed. However, the communities were drawn to all the indigenous characters presented on the poster, because the communities could identify with the characters. Personal avatars are often used to represent oneself [32] and become the means of co-constructing of one's identity [36]. Although these characters could not be "taken" by the individuals and "customized" to their own liking, some community members were stunned by how realistic and look-alike they were, and many showed appreciation for manifesting their own identity in the poster. These findings highlight the importance of identity, and we suggest that its role should be explored further in gamification research.

Additionally, Easter Eggs technique proved to be particularly effective in engaging the kids in the poster. Easter Eggs technique is much less frequently discussed in the literature [34] than more commonly used elements, such as points, badges and leaderboards [37]. In this study, we have observed that it is not just a form of reward that an individual receives for exploring an environment. For the communities it provided a sustained engagement, whereby the adults were drawn to the poster by their kids, after all the animals were found. In these moments of meaningful engagement, they became more attentive to the poster, while explaining to the kids what the poster said, and thus more perceptive to the recommendations provided. Therefore, the hidden animals became a catalyst of a new social practice.

4.3. Challenges of indigenous research

This study is representative of the dilemma of methodological rigor and relevance in gamification research [38], whereby the design of the study can satisfy the requirements of internal and external validity, and at the same time stay relevant to the non-academic users. In line with the indigenous research methodology and supported by our observations, engagement with indigenous people requires highly participative approach, involving co-construction of mutual understanding of the problem area and co-development of the response. This is particularly visible in how the discussions during unstructured interviews unfolded. The indigenous leaders were questioning the questions of the field researcher and challenging the status quo, the very essence of the problem area, i.e. why this virus is considered more important than other disease that claim lives of hundreds of thousands of people every year. When such dynamic occurs, an investigator cannot remain a mere observer, as their biases are entwined in their personal understanding and experiences, as well as mutual experiences of both parties, and which provide the basis for interpretation of the empirical materials [39]. Thus, traditional notions of methodological rigor is difficult to apply in such context.

One of the key success criteria of this project was the trust that indigenous communities developed with the field researcher, ensuring that the communities would engage with the research team. Trust is a social construct that is highly fragile [40]. An investigator has to respect the boundaries of what is considered acceptable by the community. If the investigator were to attempt conducting a survey to ensure rigorous evaluation of the impact of the intervention, the trust would have been undermined. Alternatively, the impact could have been evaluated by means of longitudinal observations, traditionally used in ethnographic studies, particularly in indigenous research [7]. However, this approach is not feasible in times of a pandemic, especially when the participants are located in remote and difficult to access areas such as a rainforest. These considerations further question the uncompromising nature of definition of methodological rigor and its applicability in different contexts.

5. Concluding remarks

This paper presents the results of the study of developing a gamified communicative strategy for mitigating the impact of the pandemic in indigenous communities of the Choco region, Colombia. The present study goes beyond communication with indigenous communities and its findings expand our understanding of the community-based and needs-centered communication strategies overall. The positive impact of gamification

complemented and amplified the role of care and sincere interest in the needs of the communities in question. That altogether contributed to overcoming centuries' long distrust and barriers or gaps in apprehension and perception of the communities constructed by it, which in its own right made the communicative strategies more successful. Both direct and indirect participation of the communities at different stages of the design process, the team's attention to the details of the communities' realities, and their inclusion in the design of discrete gamification elements, together with more explicit gamification techniques such as Easter Eggs and avatar ensured the engagement of the public, and their attentive and reflective reading of information.

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