

So yu waan tu lern Limon Kryol? Considerations of Virtual Reality for Endangered Language Preservation and Learning

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ABSTRACT

Virtual Reality (VR) has gained traction as a plausible option to preserve languages. Nonetheless, VR approaches for language preservation and learning have mostly been centered around non-endangered languages instead of endangered ones. This project investigates the design considerations to learn, practice, and preserve an EL through VR. We created a mobile VR environment to highlight Limonese Creole, an endangered language from Costa Rica’s Caribbean region. This work sheds light onto the importance of creating VR content for underrepresented populations, with a particular focus on the additional complexities surrounding endangered languages preservation.

Index Terms: Human-centered computing [Accessibility]: Accessibility systems and tools—; Human-centered computing [Human computer interaction (HCI)]: Interaction paradigms—Virtual reality; Social and professional topics [User characteristics]

1 INTRODUCTION

Languages are a defining element of a culture [15]. As such, approaches to preserve them have been widely explored [22]. Virtual Reality (VR) has gained traction as a plausible option, as users can practice concepts like listening comprehension and peer-assessment more actively [5, 13]. Nonetheless, VR for language preservation and learning has mostly been limited to non-endangered languages [20]. The context of VR for endangered languages (EL) preservation is more complex [18]. For instance, speakers can suffer discrimination [7] or might be disproportionately distributed [23], and government entities might not provide learning support [25].

This project investigates the design considerations to learn, practice, and preserve an EL through VR. We created a mobile VR environment to highlight Limonese Creole, an EL from Costa Rica’s Caribbean region [21, 30]. Input from native speakers and language activists was obtained to design the environment, highlighting key cultural aspects of the population. Once inside VR, users are transported to a virtual depiction of a traditional outdoor market in the area. The players will visit the stores and gather ingredients to prepare traditional recipes while learning vocabulary as they progress.

2 LITERATURE REVIEW

VR has emerged as an innovative tool for addressing educational and language learning contexts [20]. VR can represent real-life scenarios to provides learners with opportunities to practice a new language in context [12]. This experiential learning accelerates vocabulary

retention, enhances pronunciation, and builds confidence [10], while also fostering cultural understanding [26].

Albeit effective, a systematic review of research on VR for language learning reveals a predominant focus on widely spoken and non-endangered languages [6], which is leading to overlooking a critical part of the global linguistic heritage that is at risk of disappearing [9]. For instance, researchers have highlighted the underrepresentation of approaches that integrate cultural understanding, technology, and community empowerment for sustainable language preservation [17]. This underrepresentation underscores the need for more inclusive perspectives, particularly in the development and expansion of VR technology to sustain linguistic diversity.

In the pursuit of EL preservation, researchers have explored game-based VR environments, focusing on principles of experiential learning [29]. These systems aim to go beyond traditional language instruction by embedding engagement with the language in culturally relevant narratives. Learners interact with virtual environments that mimic real-life scenarios, learning by doing and engaging as many of their senses as possible. However, further applications are necessary to ensure that the potential of VR is accessible to a broader spectrum of linguistic communities [19]. Consequently, current efforts remain insufficient to expand the use of VR technology for the preservation of EL.

To address this gap, we propose an immersive Virtual Reality environment for mobile devices, specifically designed to promote the preservation of Limonese Creole and its cultural heritage. We also highlight key aspects for immersive EL preservation.

3 LIMONESE CREOLE

Jamaicans railroad workers brought their Jamaican Creole language to Costa Rican lands upon their arrival in 1872 [21]. Over more than 140 years of presence in the country, the language evolved and developed unique features due to its mixing with the Spanish spoken in the rest of Costa Rica [2]. Currently, it is predominantly used by the african-costarrican population, most of which live on Costa Rica’s Caribbean coast. Although recent efforts have been made to strengthen and raise awareness of this language [4, 30], speakers continue to experience discrimination for speaking an “impure mixture of English and Spanish of African descendants” [27].

4 DESIGNING A VR ENVIRONMENT FOR ENDANGERED LANGUAGE PRESERVATION

We designed an immersive Virtual Reality environment to promote the language and heritage preservation of Limonese Creole. The experience introduces the user to an outdoor market by the seaside. The market resembles traditional elements of Costa Rica’s Caribbean culture. The goal of the experience is to explore the market and purchase the required ingredients to prepare traditional Caribbean recipes. To do this, users will interact with the store vendors and their products. All menus, information, and responses will be presented in Limonese Creole, following works in VR-assisted language learning [6]. By combining the use of the language, environmental elements (stores, ingredients, and scenery), and narrative,

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Figure 1: Mobile Virtual Reality environment and interactions for endangered language learning and preservation. A) A Caribbean market was chosen due to its cultural relevance. B) Traditional ingredients are seen at the shops. C) Users can interact with the ingredients to D) learn vocabulary and information about the Limonese Creole language and its surrounding culture.

the immersive experience showcases the language and its surrounding culture. The narrative, recipes, and ingredients were gathered by meeting with members of the Caribbean community.

The VR experience was designed for mobile devices. The rationale is that people in the community do not have access to VR headset devices. Contrarily, smartphones are ubiquitous, making them ideal to reach larger portion of the population. The environment and the interactions were adapted for mobile VR. For instance, the visual concept uses a simple, non-realistic low polygon style to account for rendering limitations [3]. Likewise, the system implements head-gaze for for interaction and navigation purposes. The direction at which the users points its head determines the position and orientation of the player [1]. To walk forward, the system recognizes when the user tilts its head downwards with an angle of at least 30°. Contrarily, if the user tilt its head upwards with an angle of at least 30°, the application will showcase a menu with the list of required ingredients. The system incorporates a reticle pointer (i.e., an UI element representing the gaze direction) to provide hints about the head's orientation.

Users can purchase traditional ingredients when inside the stores. Audiovisual feedback helps to differentiate which elements are interactable. Head-gaze techniques are combined with dwell selection to interact with the elements: the system will interpret that users want to engage with an ingredient if the reticle pointer stays over it for a minimum of two seconds [11]. When an item is selected, a hovering menu appears. Users use these menus to either purchase the ingredient or receive information of its origin. Figure 1 shows our application's environment and interactions.

5 KEY ASPECTS FOR IMMERSIVE ENDANGERED LANGUAGE PRESERVATION

Evaluation with speakers: While the platform was built together with Limonese Creole experts and speakers, proper user evaluation will be conducted. The team has plans to present the application in an upcoming *Nashonal Kryol Dye* (the National Creole Day, celebrated on August 30th). The team will gather feedback, from elders to children, to improve usability and verify whether the application is effectively highlighting the population's culture; cultural preservation efforts must be done together with the community, as their needs should be what drives the research [8].

Language nests in VR: Research should be done on user centered approaches to construct VR language learning environments. Technology mediated approaches for language acquisition include text translation to assist beginners learning new vocabulary [14], visualizing the word's roots, a portion of a word from which other words originate [28]. However, immersion-based approaches such as language nests have not been incorporated into VR [16]. VR could motivate the intergenerational language transference by recreating cultural elements in the virtual space. Together with linguists and educators, the project will further investigate how VR environments could be designed to afford the creation of language nests.

Preserving an endangered language: More efforts are required to use VR to assist the adoption of ELs. Language learning often assumes that speakers can practice their language freely. This is often not the case with ELs, as speakers can suffer discrimination [24]. Research should be done on motivating people to learn a language they are culturally discouraged to practice. This should also highlight the speakers' culture and struggles in a sensitive way. Our system exemplifies this by being the first Limonese Creole VR platform. By integrating cultural elements digitally, future generations can practice the language more immersively.

6 CONCLUSION

This project explores the design considerations to learn, practice, and preserve an EL through VR. We presented a mobile VR approach to promote the language and heritage preservation of Limonese Creole. Members of this community were consulted to decide the content of the application. Moreover, we highlighted considerations to design immersive EL learning applications. Future steps include evaluations with speakers of the language, investigate the use of VR for immersion-based language preservation, and analyzing VR's role in preserving ELs. Overall, the project showcases VR potential as a tool for cultural awareness and preservation.

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